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Some Thoughts
ON THE
NATURE OF CANCER.

Read at a Meeting of the American College of Surgeons held at Boston, Mass., on Oct. 11th, 1928,

BY SIR CHARLES A. BALLANCE, K.C.M.G., C.B., M.V.O., M.S LOND.,
CONSULTING SURGEON TO ST. THOMAS'S HOSPITAL, LONDON.

THE International Conference on Cancer, which was held last July in London, evoked great interest. Scientists of all nations joined in its deliberations. The goal of effort was the discovery of the intimate nature of the disease and of the means for the prevention and cure of its lethal incidence on the human race.

When Homer told the story of Troy he did not write prose or even history; he everywhere infused into it an incomparable ardour—he made an epic. An epic is a theme of action treated in heroic proportions and style. In our profession the life enthusiasms and moral qualities of such men as Pasteur and Lister present to our minds epics of incomparable ardour. Their struggles were great, the issues were great, the men were great. It appears to me that the hopeful side of our labours is that some of our colleagues are approaching the subject of the cause of cancer in the epic spirit. "The most important events of history are to the novelist what gigantic mountains are to the traveller. He surveys them, he skirts their base, he salutes them as he passes, but he does not climb them." In the same way I propose to survey, skirt, and salute some of the great landmarks in the history of research into the nature of cancer.

DEBATES AT THE CONFERENCE.

The chief papers and debates at the London Congress dealt with the early diagnosis and the relative value of surgery and radiation in the treatment of carcinoma of the stomach, mamma, uterus, mouth, and rectum, and of sarcoma of bone. There was also a short statement by Dr. T. Lumsden concerning tumour immunity and vaccine treatment, but the debate which interested me most was that on the ætiology of cancer. The use of lead as a remedy did not obtain general acceptance. There was a general feeling that the rule persists that operation is essential in the treatment of cancer, but that operation combined with radium was, in certain cases —e.g., carcinoma of the mamma—of increasing value. For sarcoma of bone, in which amputation does but delay the fatal issue, some hopeful results were reported following the use of radium and toxins or radium alone. The biological effects of radium and X rays were discussed by experts.

When I was a house surgeon it was generally thought that an attack of erysipelas after an operation for carcinoma mammæ had some effect in preventing the recurrence of the disease. I was in Berlin in 1884. Fehleisen was assistant to von Bergmann and he was infecting cases of carcinoma mammæ with the organism of erysipelas. The students nicknamed Fehleisen "erysipelas coccus." When the attack of erysipelas was severe the tumour might slough out. A death occurred and the treatment was stopped. Fehleisen was a forerunner of Dr. William B. Coley. This gives me the opportunity of paying a humble tribute to the transparent honesty and diligence of my friend Coley during a long period of years in his attack on the problem of cancer treatment. I have no doubt myself of the beneficial influence of the toxins in certain cases of cancer.

Paracelsus held that Nature was sufficient for the cure of most diseases; Art had only to interfere when the internal physician was tired and incapable. Then some remedy had to be introduced which should be antagonistic, not to the disease in a physical sense, but to the spiritual seed of the disease. I look forward to the time when our terribly mutilating operations for the cure of cancer, which must be performed at present, will be replaced by a vaccine or some such remedy which will be antagonistic to the spiritual seed of the disease. Dr. Lumsden spoke of tumour immunity and vaccine treatment. He said that antibodies could be produced which had a specific affinity for cancer cells; they attacked and killed the cancer cells without damaging normal tissue cells. After using vaccine the immunity was much higher than otherwise. He suggested that those who were treating tumours with radium should not be in a great hurry to get rid of the local growth by sloughing, because this would prevent the increase of immunity.

It has long been known that most tumours in the commonly used experimental animals retrogress after a time, and that such animals are immune and cannot be further successfully grafted. Many years ago at the Buffalo Cancer Laboratory I saw mice which had in this manner become immune. This is not at all comparable to the retrogression of spontaneous tumours. Hence the same observation is rare in man. Many surgeons of much experience have observed the slow disappearance of a malignant tumour.

No one of us doubts the importance of the early diagnosis of malignant disease. But when a cancer gives a sign or a symptom it is not in the early stage of growth. I have no faith in what has been termed the pre-cancerous stage; to me either a patient is suffering from malignant disease or he is not. I am all in favour of the intensive education of the family doctor concerning all newly discovered facts which may aid him in early diagnosis; but I am not in favour of lecturing to men and women of the lay public on a subject which they cannot in any measure understand, and which is with them ever associated with fear and dread. Fear and dread depress the resistance of the body cells and like injury may be the partial cause of the disease.

The debate in London on the early diagnosis of cancer of the stomach and on the value of excision of simple ulcer of the stomach as a preventive measure was of much interest. I would only add this: none of us is possessed of a knowledge which can allow him to state—this simple ulcer will become malignant. The prophet is a bad guide in surgery. Furthermore, I am convinced of the immense value, in selected cases of simple ulcer of the stomach, of a posterior no-loop gastro-enterostomy, the operation which we owe to your great surgeon, William J. Mayo.

EXTERNAL AGENT AS THE CAUSE OF CANCER.

In 1884 I joined the first class in bacteriology ever formed in the ancient University of Leipzig. The teacher's name was Becker, who was Koch's first assistant. The class was held daily for six weeks and was a great success. Becker insisted that Koch's four postulates must be fulfilled before any living organism could be held to be the cause of the disease. This is as true to-day as then. My family had been decimated by malignant disease, and as a student I had made up my mind, when opportunity offered, to work at its intimate pathology. When I returned to England I met the late Prof. S. G. Shattock, who was a microscopist, and we started together on the great adventure. Sir John Simon and Sir James Paget and other great pathologists of the mid-Victorian era had noticed the vital difference in activity of the normal and cancerous epithelial cell. Speaking generally, the cancerous epithelial cell is indistinguishable anatomically from the normal epithelial cell, but its physiological life is different. The one has a normal life, but some profound change has happened to the cancer cell. It has become endowed with an immortal life and the property of endless growth. In those early days it was suggested that some outside spermatic influence caused the change in the epithelial cell which gave to it an immortal life. Whatever takes place in our bodies has two distinct factors—the intrinsic factor, which is the constitutional or

resisting power of the cells affected, and the external injurious agent. The spermatozoon, meeting the right ovule, may create a life—a sort of other life or parabiosis. I have always inclined to the belief that an external agent is the essential cause of carcinoma; that the infected epithelium is the habitat of the external agent, and that it will live and grow in none other.

In carrying out a research on the intimate nature of any disease it is essential to have an hypothesis of the nature of the disease in order to plan a scheme of work. The only scheme of work on the intimate nature of cancer which offers a prospect of success must be based on the hypothesis that some external agent is the essential cause. If it were possible, which it is not, it would be well if all our experimental work on the intimate nature of cancer could be carried out on carcinomata, since certain types of round-cell sarcoma are not easy to distinguish microscopically from granulomata, while the microscopical appearances of the carcinomata are so definite that no mistake is likely to occur. It is quite possible, and indeed probable, that the same external agent is the cause of both sarcoma and carcinoma. In the one case it finds a habitat in the mesoblastic cell, and in the other in the epiblastic or hypoblastic cell. Sir James Paget long ago pointed out that the same insect produces different kinds of galls according to the different sites of oviposition.

The view that sarcoma and carcinoma have a common origin receives support from the tale of a case reported in 1926 in the *Annales d'Anatomie pathologique* by Lècase and Lacassagne.

In 1923 a woman was operated on for advanced carcinoma mammæ. Two weeks afterwards a student of medicine, aged 21, was told to remove by a syringe fluid collected under the scar. In doing so a sudden movement of the patient caused the needle to be driven deeply into the palm of the hand of the student, and a small amount of the fluid in the syringe also entered the palm. Two years later there was a hard swelling with pain in the palm of the hand and glands in the axilla were enlarged. A little later several small tumours appeared in the forearm and arm and amputation of the limb was performed.

The beautiful illustrations accompanying the paper show clearly that the mammary tumour was a spheroidal-celled carcinoma, while the tumours which grew in the student's hand and arm were spindle-celled sarcomata.

Comparison with Tuberculosis.

When I was a student anthrax was taken as the standard of comparison in pathological mycology. Let us take tuberculosis as the standard of comparison in the study of malignant disease. The late Dr. Bristowe compared cancer with other infective diseases and stated that in his view every general specific disease begins as a local process. This is true of both tuberculosis and cancer. The clinical history of sarcoma or carcinoma is so closely akin to that of tuberculosis that it is quite within the truth to assert that there is no feature in the last-named disease which is not paralleled in the others. Before 1881 the authorities regarded tuberculosis as a disease with many causes. To-day some authorities regard cancer as a disease of many causes and the specific organism remains undiscovered. But the analogy between tuberculosis and cancer is perfect, and repudiation of the analogy leads only to despondency and despair.

The endemic location of cancer comprehending sarcoma and carcinoma, about which much might be said, is a highly remarkable fact in the history of malignant tumours.

The phenomenon of atavism has been observed both in tuberculosis and cancer. "Parents seemingly healthy may beget a family of children who all die of phthisis. The taint is latent in transitu." It is within my knowledge that whilst the first and third generations of a particular family were devastated by cancer, the second wholly escaped. Paget wrote: "The tendency which exists in the parents may never become in him or her effective, although it may become effective in the offspring." These events appear to result from temporary impoverishment of the peculiar soil; or the atavism might depend not on the subject, but on the parasite itself, the life of which might present an instance of alteration of generations. The phenomenon indeed may be comparable to that which necessitates in agriculture a rotation of crops. In carcinoma the primary tumour is seated most frequently at sites where an infection from without would most readily take place. The metastasis by lymphatics or blood-vessels in carcinoma or sarcoma is such as occurs in tuberculosis. It may be restricted to the lymph glands or be as widespread as a generalised tuberculosis (general sarcomatosis or carcinomatosis). Even the glandular infection which occurs at times in tuberculosis without primary lesion has its counterpart in the squamous-celled carcinoma of the inguinal glands in chimney-sweeps, in whom there may be no discoverable primary growth. The latency of glandular infections is equally represented in tuberculosis and carcinoma. The sarcoma that grows at the end of a long bone after injury is comparable with the tuberculous osteitis ensuing under similar circumstances. Injury is the partial factor; the other factor in the case of tuberculous osteitis we know to be a specific virus. The relation of injury to tumour growth is illustrated by the case of a patient who fell, striking the forehead against a sharp iron spike. The spike perforated the skull and brain. Death occurred eight months later. The cause of death was angeiosarcoma of the meninges and brain. The patient's brain would seem to have been inoculated at the time of injury with the virus of malignant disease as surely as a tube of culture medium is inoculated by plunging into it a platinum point deliberately charged with infective material.

Carcinoma has sometimes a purely local origin in the same way that a tuberculous infection may arise from direct inoculation. Take, for example, a case of squamous-celled carcinoma of the lip. While still a local disease it may be completely eradicated. The case, in fact, is directly comparable to one of local tuberculosis from direct inoculation or to external anthrax, which is still a local process, and might be termed one of local carcinomatosis. Local irritation and injury are sometimes spoken of as causes of cancer. But this is not so. The efficient cause lies beyond the irritation or injury which are but the partial causes of the disease. The injury prepares a nutrient soil favourable for the growth of the tubercle bacillus or the effective agent of malignant disease. Hereditary predisposition or diathesis is nothing more than the presence in the body of a soil suitable for the growth and development of the virus.

Many examples of auto-inoculation have long been recognised, such as cæcal carcinoma, associated with numerous lesser growths in the colon or an œsophageal carcinoma associated with several small growths below the primary tumour. These multiple small growths point to the possibility of an auto-inoculation of the same kind as occurs in tuberculous ulceration of the intestine. Such facts prove that the cancerous epithelium has been transferred as a graft, but it does not prove the presence of a parasitic virus. It proves only that the cancerous epithelium cell or the agent which made it cancerous is infective.

When tubercle spreads through the body from a primary lesion all the secondary lesions are typical of the disease and contain the virus of it. The special anatomical characters of the secondary growths in carcinoma are ample proof of their source from the primary tumour. In sarcoma the best proof of the same fact is furnished by the melanotic variety, where the pigmentation of the secondary tumours is sufficient evidence of their origin from the primary growth.

Experimental Research.

After the rise of modern bacteriology strenuous efforts were made to cultivate a specific microphyte from carcinoma. The results were uniformly negative. The failure of evidence in this direction led to the suggestion that the hypothetical micro-

parasite might belong to the animal series, but the experiments in this direction were also negative. How is the infection communicated to the epithelium if the carcinomatous parasite is a protozoon? How is the function of the first infected epithelial cell changed from a benign to a so-called malignant character? It may be in one or more of the following ways: (1) By absorption of a chemical product which is secreted by the parasite. (2) By the passage into the epithelial cell of the organism, the latter maintaining a separate existence in the former. (3) By the process of rejuvenescence in which the flagging life of a protozoon is revived by means of union with another.

What happens to the epithelial cell first infected? Although single binary division is the chief mode of reproduction another method of multiplication is by the nipping off, or budding, of spores from the parent cell. It is also not uncommon for a protozoon to break up into from 10 to 100 or more pieces or spores. Each piece contains all the elements of a perfect cell. If the carcinomatous cell has a similar life-history the pieces or spores of the subdivided epithelial cell may each grow into an adult carcinomatous cell, or may be thought of as conjugating with the surrounding normal epithelium, and of being the *fons et origo* in them of a carcinomatous rejuvenescence.

In sections of carcinoma there are certain appearances in the cells which were thought years ago to indicate the presence of a protozoon. I may cite the papers of Noeggerath, Soudakewitch, Foa, Ruffer, and Ludwig Pfeiffer. The opinion of Metchnikoff was that the appearances indicated nuclear degeneration. I do not know whether the virus of Gye belongs to the vegetable or animal kingdom, but if we suppose that it has its habitat in the nucleus of the cancer cell (and there are some reasons to think that this is so, though at present the optical difficulties of demonstrating it seem insurmountable) it is possible that some of the previous microscopical researches on the nucleus of the cancer cell may not have been all fruitless. Indeed it may be asked why should the nuclei of the actively growing cells at the periphery of a malignant growth show signs of degeneration? The failure to transplant human carcinoma to the lower animals might be due to the fact that it is necessary for the parasite to assume a phase outside the human host in order to transmit the disease. This side of the problem has not been perhaps sufficiently explored.

As germane to this point Prof. Shattock and I carried out a series of experiments with the object of seeing whether experimental infection could be brought about from the psorospermial bodies so common in the rabbit's liver. We were led to do this after Darier's description of the presence of psorospermia in the epidermis in Paget's disease of the nipple and the alleged association of psorospermia with carcinoma in general. The experiments were performed upon rabbits, monkeys, dogs, and rats. The chief experiments were performed on rabbits as being most likely to receive infection. Intravenous and other methods of introducing the psorosperms were employed, but in no case was the animal infected.

If the positive results attained do not prove the existence in malignant tumours of an external agent it must be borne in mind that the negative do not disprove it. They show only that the methods employed to demonstrate it were not suitable. The method of transmission in infective diseases is not always so direct and simple as such grafting experiments presuppose. It has been shown, for example, that malaria cannot be transmitted between birds by the injection of blood containing the hæmatozoon. It has been shown, too, that the capsule of an encapsulated protozoon consists at times of chitin or of cellulose. Both of these substances are absent from the tissues of vertebrates. Further pathogenic bacteria produce in cultures albumose. Neither chitin, cellulose, nor albumose can be demonstrated in a carcinomatous tumour.

Though it has not been possible to transfer human carcinoma to the lower animals it is well known that carcinoma can be transferred from animal to animal of the same species, and even from man to man.

One of the best and earliest examples of transference from animal to animal was recorded by Hanau, who successfully engrafted squamous-celled carcinoma from a rat into a series of other rats. In one experiment small portions of the tumour were placed in the abdominal cavity. Death ensued after three months and the abdominal cavity was found at the autopsy filled with nodules which presented the typical structure of squamous-celled carcinoma. Dr. Hanau showed me microscopical sections of the growth which was placed in the peritoneal cavity and also sections from the growing nodules taken after death from the peritoneal cavity. All the microscopical sections showed a squamous-celled carcinoma of the same type.

Since Hanau's experiment numerous investigators have worked intensively on the intimate pathology of cancer, and the discovery of the filterable viruses has opened out wider fields of research.

In 1913 Fibiger published a research on cancer of the stomach in rats. He was the first to cause experimentally a malignant growth. The ingestion of cockroaches infected with a special spiroptera, or the ingestion of the nematode larvæ obtained from the muscles of the cockroach, produced squamous-celled carcinoma in the cul-de-sac of the stomach. The eggs of the parasite were found free between the epithelial cells of the cancer. The cockroach is the intermediate host.

Virus or Enzyme.

In London at the conference debate on the ætiology of the disease the main discussion centred on the work of Rous, Borrel, Murphy, Gye and Barnard, and Leitch. Dr. Murphy said that now after many experiments the real nature of the cancer agent seemed to be emerging. He said that it was possible to extract with a considerable degree of regularity from the normal testes of the fowl a substance which, when injected into a normal fowl, would produce a malignant new growth. Dr. Murphy's belief is that the external agent is an enzyme, not a virus. Prof. Leitch supported the view of Dr. Murphy and stated that he had obtained a typical Rous sarcoma by the injection into a fowl of an extract of a normal fowl pancreas. The statements of Dr. Murphy and Dr. Leitch did not carry complete conviction to my mind. I am by no means convinced that the experiments of Murphy and Leitch constitute a final settlement of the work of Gye. Whether the causative agent is a virus, as Gye maintains, or an enzyme, as Murphy and Leitch hold, its most remarkable quality is its specificity in action. This specificity enables it to produce invariably the same type of tumour as that from which the agent was obtained. What does emerge is that the best workers in this field of pathology are agreed that there is an external agent concerned in the production of cancer.

Sir William Bragg, in an address to the British Association for the Advancement of Science last month, reminded his audience that in the nineteenth century light was regarded as a series of waves in an all-pervading ether. This theory was based on profound mathematical analysis and brilliant and far-ranging observations. Sir William added that there is no question of its truth in the ordinary sense. But in the twentieth century a new field of optical research had been opened up and had led to the inference that light had many of the properties of a stream of minute particles. This theory has passed the experimental test, and many experimental facts, inexplicable on the wave theory, are explained by the particulate theory. But how can anything be at once a wave and a particle? As yet there is no hint of reconciliation.

The dilemma is a rift in the whole fabric of scientific certainty. Is not the biologist in the study of the nature of cancer up against a dilemma which may be compared to that which now agitates the physicist? Virus or enzyme? Particle or wave? But there is hope of escape, as the *Times* suggested, for the scientific methods which have revealed it are still only scratching the face of the unknown. When bacteria were first recognised as the cause of disease it was thought that their presence alone induced

the disease. It was not till later that disease was discovered to be due to a specific chemical poison secreted by the bacteria. What is an enzyme? I do not know, but I do know that any active substance in the body—for example, a ferment—is manufactured by a living cell. This truth brings the virus and enzyme theories into close relation. Spontaneous generation being excluded, the crucial question is: What of the cell which manufactures the enzyme of Murphy? I am indebted to Dr. C. H. Andrewes for permission to refer to his work, which will be published this month.[1] He has repeatedly precipitated vaccine lymph and the final extract remains effective in the production of vaccinia. Dr. Andrewes states that the process can be repeated indefinitely. No one can suppose that the globulin precipitates are, *re* globulin, the cause of vaccinia. It is clear that the virus has passed through all these stages of the purification of the original material without losing its specific character. In the same way I suggest that the frequent precipitations employed by Murphy in the case of the extract of fowl testes, which he believes frees the resulting fluid from the virus of malignant disease, fails to do so. The reasonable conclusion is that the precipitated neo-protein carries the virus with it. The fact that in certain cases the virus of fowl sarcoma is to be found in the testes of this creature presents little difficulty to my mind. It is only an interesting observation, for we know that the organisms of disease lie latent in our bodies. Otherwise it would not be possible to explain after injury to the testicle or to a joint the occurrence of tuberculous epididymitis or tuberculous arthritis.

The rare tumour chorionic carcinoma occurs in the uterus and occasionally in the Fallopian tube and ovary. When the Fallopian tube or ovary are affected it may be presumed that these organs have been the seat of early ectopic gestation. The tumour occurs at any age within the limits of possible pregnancy. It would seem that the spermatozoon carried with it into the mature ovum not only its natural growth-producing power, but also the external agent of carcinoma. It is possible that the spermatozoon in chorionic carcinoma is the host of this agent which is the essential cause of carcinoma. As germane to this view, it may be remembered that chorio-epitheliomatous elements are found in certain testicular tumours.

When I entered the profession the members of the Pathological Society of London were engaged at their meetings in showing specimens of disease obtained from the post-mortem room. But the times were changing. The work of Pasteur and Lister had begun to permeate the profession. Anæsthesia had been discovered. Gross disease could be examined in vivo and not only on the post-mortem table. The great age of dead meat pathology was passing away and in its place a living pathology was arising whose aim was the study and discovery of the intimate causes of disease.

I have already mentioned that as a working hypothesis in the search for the cause of cancer I pin my belief to an external cause. In all diseases where the pathological anatomist has the authoritative voice intrinsic causes are sought after and extrinsic causes are relatively neglected. The idea of a specific extrinsic cause of any disease has owed its origin either to non-medical men like Pasteur or in later times to bacteriologists; pathological anatomists have never embraced the idea enthusiastically. Indeed they have generally resisted any encroachment from this direction upon their special domain. I remember the opposition of the great Virchow to the opinion that tuberculous disease owes its origin to a specific microbe; his opposition, in spite of his unrivalled authority—an authority no man could support now—was broken down because of the relatively simple and easily verifiable bacteriological findings of Koch. If the demonstration of the tubercle bacillus were entirely dependent upon animal experimentation of a complex character, depending for interpretation upon acute insight into the pathological problem, and upon scientific imagination in estimating probabilities, I doubt whether to this day the opposition, now proved to be reactionary, of the morbid anatomist would have entirely disappeared.

In 1880 I attended a lecture by Sir John Burdon Sanderson. The subject was the Nature of Scrofula. He described how he had gathered dust from St. Paul's Cathedral, from Westminster Abbey, and from his own drawing-room, and how it had been placed under the skin of a series of guinea-pigs. The result, we were told, was that all the guinea-pigs were infected with scrofula, and that the disease could not be a specific one, as the specific agent could not be supposed to be in all these three places at the same time. I and my friends left the lecture theatre feeling that the argument was not conclusive. The following year Koch demonstrated the tubercle bacillus.

Limitations of Morbid Anatomy.

In considering the problem of the cause of cancer I am not disposed to attach great weight to the opinions of those who merely study appearances of dead tissues under the microscope. I accept with due thanks their contribution towards the pathological definition of the fine structure of the cancer cell, but I am not prepared to be governed by their theories. It is to animal experimentation that we must look for the solution of this mysterious problem. The pioneers of cancer investigation—Jensen in Denmark, Borrel in France, and Loeb in America—confirmed the earlier studies of men like Hanau who had shown that animal cancer differs in no respect from human cancer and may be transmitted from animal to animal by the process of grafting. They showed, however, as the late Prof. Shattock and I did, that all the cancers studied gave no evidence of a cause separable from the cell. The cell appeared to be the indivisible unit of the disease. These observations, confirmed by experimenters all over the world and especially on a large scale and with great exactitude by Bashford and Murray in London, gave no encouragement to those who believed in an extrinsic cause of the disease. Some were overwhelmed by the apparent completeness of the proof—or really by the absolutely negative character of all attempts to find an extrinsic cause. Even Borrel, one of the earliest and most energetic pioneers and a believer in the microbic cause, was nearly swept under by the wave of confident dogmatism which teaches that the disease cancer is a cell in which nuclear degeneration independent of microbic activity has occurred. Borrel was never able to accept this sweeping conclusion and endeavoured to resist orthodox opinion. He stood almost alone for a long time, neglected and powerless.

The tremendously strong dogmatic world-opinion is still uppermost, but not all-powerful. Murmurs of discontent with the stagnant stage of cancer research have been heard in every country. In England the formation of the British Empire Cancer Campaign owes its origin largely to the existence of the feeling that new blood was required to study afresh the origins of cancer. Doubtless in America you have felt somewhat similarly. This murmuring of opposition to the authority of the pathological anatomist has found expression in attempts to get behind the problem of cancerous growths by instituting departments of biophysics, biochemistry, and so forth. But it is not very likely that the true solution of the problem will come from oblique investigations. The study of cancer must be direct. But since the investigations of cancer institutes have proved so barren in their negativeness, where shall we look for the lead in the great problem?

During the last three years there has been much discussion and more criticism of the researches of my countryman Gye. Now I should like to express my views on this matter. At once I must make it clear that I am not competent to discuss all the details of such work; I can give the reflections of one who has witnessed the fluctuations of medical opinion during

[1] The paper referred to was published in the Jour. Path. and Bact., October, 1928.

50 years and has seen that which was abused, accepted, and proved true.

I can look back to a period of research beyond that which embraces the lives of most of my hearers. I have heard Virchow, Helmholz, and Ludwig lecture, and I have seen Pasteur and Lister and Paget at work. I was a distressed and angry witness of the opposition and abuse which assailed Pasteur and Lister in the early days of their immortal labours.

The first point in Gye's work is this, that he sees the lead in cancer investigation to lie in the study of the remarkable group of fowl tumours which were first brought to light by Dr. Peyton Rous, of the Rockefeller Institute. They are the exceptions in cancers in this, that they give evidence of a cause; and, as has happened so often, exceptions to general rules are likely to yield new knowledge which extends general laws. The work of Peyton Rous in proving the neoplastic nature of these fowl tumours has been properly acknowledge by Gye, who has sought to understand the nature of the cause of these tumours and to link together the fowl and the mammalian tumours.

The essential claim which Gye makes is this, that the clear cell-free filtrate which is obtained by extracting a fowl tumour with saline, and which contains the tumour's cause, is not a simple single thing. The "agent" of the tumour is complex. Now the experiments which have been published in support of this contention have met with but little support. But if one takes into consideration the very, very delicate nature of the tumour agent, the fact, for example, that it disappears or becomes impotent after mere incubation at 37° C. for a few hours, and that it is only demonstrable with the highest power of the microscope and with the use of ultra-violet light, it is easy to understand that the difficulties of the work are very considerable. Gye believes that the evidence he has adduced is good enough, at least as a first approximation to the truth, to show that the virus found in the fowl tumours is common to many animal and human tumours.

Conclusion.

I cannot form a definite opinion upon all these technical matters, but I have been for 50 years intensely interested in, and have done a little work on, the problem. I would put forward this point for your consideration. It is not sufficient for anybody who is deeply concerned with the cancer problem to be merely destructive in criticism; it is the duty of critics to find some other explanation of the peculiarities of the cancer problem if Gye's turns out to be wrong. At present it is the only explanation which fits together a series of apparently irreconcilable observations.

THE DIAGNOSIS OF LEPTOMENINGEOMA OF THE SPINAL CORD.

WITH A REPORT OF THREE CASES SUCCESSFULLY TREATED.

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Most organic lesions affecting the central nervous system are progressive, do not readily respond to treatment, and carry with them a grave ultimate prognosis. The treatment consequently becomes palliative. This, however, is not true of leptomeningeoma of the spinal cord, where the treatment, if carried out early, leads to cure. The importance of early diagnosis, therefore, becomes paramount. It is only when surgical measures are resorted to before complications are superadded and permanent damage has resulted from compression of the cord that we can promise the patient permanent relief from the distressing symptoms. Before emphasising certain important factors presented in the symptomatology of this condition, a report is given of three cases successfully treated.

The First Case.

A spinster, aged 50, first came under my care in August, 1921. At the age of 14 she had had tuberculosis of the right elbow and left foot, which had necessitated excision of the elbow-joint and amputation of the left big toe. She had then enjoyed good health until May, 1921, when she complained of backache. The pain, situated in the centre of the back in the mid-dorsal region, was severe and occasionally sharp and accentuated on movement. There was at that time no weakness nor sensory disturbance in the lower extremities, and no history of bladder trouble. Muscular power and sensory function in all the limbs were normal; the plantar response was flexor and the knee-jerks were only slightly exaggerated. X ray examination of the back disclosed osteo-arthritis of the spine with prominent lipping of the vertebral bodies.

With a diagnosis of osteo-arthritis of the spine, the patient was sent to Buxton for treatment. Whilst there she noticed numbness in the lower part of the abdomen, commencing on the right side and later spreading to involve the feet. This was followed by weakness in the legs (especially the right) resulting in great difficulty in walking. The pain in the back was severe only on movement and remained localised, and accompanied by local tenderness. Spasmodic movements of both legs prevented the patient from sleeping at night. These symptoms increased, and when she was re-examined on Oct. 2nd, 1921, there was complete loss of power in the right leg and considerable weakness of the left. Both limbs were spastic, the deep tendon reflexes were increased, abdominal reflexes were absent, and the right plantar response was extensor. Ankle-clonus was present on the left side. There was complete loss of sensation to pain, heat, and cold on the left side as high as the ninth thoracic segment, while on the right side there was numbness to pin-prick only. For the past three days the patient had experienced difficulty with micturition, and for 24 hours there had been complete retention. Four pints of urine were withdrawn by catheter.

A diagnosis of spinal tumour was made, and on Oct. 5th laminectomy was performed by Mr. A. J. Walton. A localised tumour, exposed between the seventh and eighth thoracic segments, was found compressing the spinal cord and was easily removed. (Fig. 1.) The patient made a steady and uninterrupted recovery. A month after the operation she could move both legs and stand unsupported, and had regained complete control of the sphincters. Three months later she was able to walk a hundred yards without support and, apart from occasional cramp-like spasms in the legs at night, was free from any discomfort. She improved steadily, and ten months after the operation she had returned to work as headmistress of a school with 130 girl pupils. In the summer of 1926 she had done a great deal of walking in Lugano, Chamonix, and Grenoble, including several "good climbs." When examined in January, 1927, the movements of the lower limbs were good, there was no rigidity, and the plantar response was flexor. A little numbness at the level of the seventh dorsal vertebra was the only sensory change remaining. When next seen, during the summer of 1928, her condition was excellent.

The specimen removed at operation was examined by Prof. Hubert M. Turnbull, who made the following report:—

Macroscopic Examination.—The specimen (S.D. 1646, 1921) was oval, measuring 2·5 × 1·5 cm. and 0·8 cm. in its greatest thickness. The surface was covered with delicate, blood-stained, fibrous tags. The cut surface showed a very thin, white capsule surrounding a moderately soft, pale brown, somewhat granular tissue, in which there were a few reddish brown areas and small cysts.

Microscopic Examination.—The mass was bisected, and one-half was fixed in 2 per cent. saline formaldehyde and embedded in paraffin. Sections were stained with Ehrlich's hæmatoxylin and eosin, by Van Gieson's method and Masson's modification, with Weigert's fuchselin and neutral red, by Perl's method, by the Weigert-Gram method, with Masson's trichromic stain C, and with Mallory's phosphotungstic acid hæmatoxylin after Zenker's fluid. The portion of tissue is approximately semi-circular, the convex surface being an outer surface covered with blood and the straight surface a plane of incision. The tissue is in places compact, but is for the most part rarefied to a variable degree by œdema; small and large confluent, round cystic spaces lie within the most rarefied areas. It contains several areas of recent hæmorrhage and a very large number of cells

loaded with iron pigment. The compact areas are composed of interlacing bundles of parallel, spindle cells. The bundles enclose vessels, and the cells are usually directed in the long axis of the vessel. There is frequently a zone of polygonal cells immediately round the vessel; occasionally a zone of short spindle cells arranged radially. The nuclei are usually oval, being elongated and narrow in the long spindle cells. The nucleus has a delicate membrane, a close net of very delicate chromatin fibrils, and a few large nodes of small nucleoli. The spindle cells are very long and narrow. Their cytoplasm in ordinary stains appears to consist of longitudinal fibrils, and is ill-defined. In Mallory's hæmatoxylin numerous delicate, somewhat wavy fibrils are stained in places. Some of the vessels have a narrow wall of delicate, collagen fibrils. Most have a wide wall of hyaline collagenous tissue containing a few cells; the wall is usually sharply defined, but sometimes delicate collagen fibrils extend for a short distance between the surrounding cells.

In the rarefied areas the shapes of the cells become more clearly seen the more the cells are separated from one another, and sharply defined fibrils are conspicuous in Mallory's hæmatoxylin. Most of the cells are very large and have the form of long tapering spindles, spindles forking at one or both extremities, triangles with one or all angles extended, or pears with elongated stalk. Less common are cells which have little cytoplasm and are either of similar shapes with curtailed processes or approximately spherical. Fibrils course within the large cells, particularly along the margins, and the cytoplasmic processes end in very long fibres. Between the cells is an abundant feltwork of sharply defined fibrils. In places this feltwork is very dense: there the cells are usually scanty and small, and are occasionally definite astrocytes. The cystic spaces contain a tangle of delicate, feebly stained fibrils, and have no definite lining. The fibrils are dark blue in Mallory's hæmatoxylin, red in Masson's trichromic stain, and Gram-negative. The outer surface is bounded in places by a narrow zone of collagenous fibres among which are no elastic fibrils. Beneath the surface are a few veins with fibro-elastic walls, and one large muscular artery surrounded by a wide adventitia of stout collagenous and a few elastic fibres.

The tumour consists of atypical neuroglia; it is therefore a gliosarcoma in the less restricted sense of this term. The enclosed artery is unlike the arteries within the spinal substance, so that the tumour involves the meninges and has probably arisen therein. The tumour is an intrathecal, hæmorrhagic, œdematous, cystic gliosarcoma, probably of leptomeningeal origin.

The Second Case.

Female, aged 48, first came under my care in January, 1927. She was married, with eight healthy children. For six years she had suffered from "neuritis" in the legs and feet, and for the last 12 months had noticed weakness and stiffness in the left leg and ankle, and these symptoms had slowly but steadily increased. She also complained of severe cramp-like pains in the calf of the left leg, frequently accompanied by uncontrollable spasmodic flexion at the knee. When walking she had noticed that the left ankle kept turning outwards, and for this reason she was believed to have flat feet. For two months the right leg had been numb and cold and the site of occasional sharp pain. There was also difficulty in commencing the act of micturition, but no incontinence.

The patient was a strong, heavily built woman. Examination of the heart and lungs disclosed no abnormal physical signs. The left leg showed slight general wasting and was cold, and gross spastic weakness of all movements was present. The right leg, although exhibiting slight spasticity, showed no obvious weakness. All the abdominal reflexes were absent, and the knee- and ankle-jerks were exaggerated on both sides, especially on the left. Both plantar responses were extensor. There was loss of sensation to pain, heat, and cold up to the level of the seventh thoracic segment on the right side, and these sensations were delayed in the left leg. Sense of touch was not impaired in either leg. There was gross impairment of sense of position in the left foot and some in the right. There were no sensory or motor changes in the upper limbs. The blood count was normal. The Wassermann reaction in both blood and cerebro-spinal fluid was negative. The cerebro-spinal fluid was not under pressure, was clear, and contained no excess of protein; the cell count revealed 20 small lymphocytes per c.mm. An X ray examination of the spine revealed no abnormality in the vertebræ.

On Jan. 26th, 1927, 2 c.cm. of lipiodol were injected into the cisterna magna through the atlanto-occipital space. Subsequent radioscopic examination of the spine showed that the lipiodol was held up at the level of the first thoracic vertebra for about two and a half hours (Fig. 4), that then it gradually trickled past, and that after three hours it had completely passed to the bottom of the dural sac. After the injection the symptoms became rapidly worse. Two days later there was complete loss of power in both lower limbs; the pain and spasms in the legs had disappeared, and incontinence of both urine and fæces was present. The sensory changes had increased in distribution, and a definite zone of hyperæsthesia was present at the level of the second thoracic segment.

Laminectomy was performed by Mr. A. J. Walton on Feb. 4th, 1927. Incision of the dura mater revealed a tumour on the left side of and compressing the spinal cord at the level of the third thoracic spine. The tumour (Fig. 2) was readily removed. The patient made a steady recovery and soon regained control of her sphincters. When examined on May 31st, 1927, she was able to stand unsupported and to walk a few steps unaided. When last seen, in October, 1928, she was able to walk a distance of one and a half miles without feeling tired. There was no pain and no difficulty with micturition. When placing her feet in a warm bath she still appreciated the heat more readily on the left than on the right side. The tendon reflexes were present and equal on both sides. Ankle-clonus was not elicited. The plantar response on the left side was flexor, but extensor on the right. Sensation on the left side was normal, but pin-prick on the right side was only appreciated as touch up to the level of the third thoracic segment.

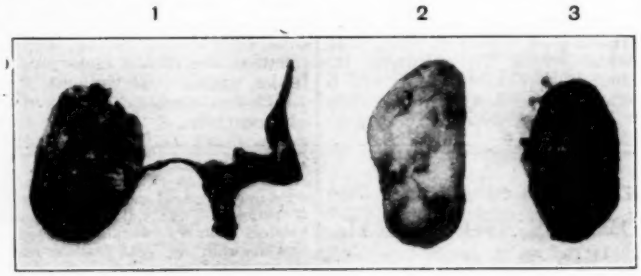

FIG. 1.—Tumour with portion of pia mater attached removed in Case 1.
FIGS. 2 and 3.—Tumours removed in Cases 2 and 3. (Natural size.)

The specimen removed at operation was examined by Prof. Turnbull, who made the following report:—

Macroscopic Examination.—The specimen (S.D. 249, 1927) was received in formaldehyde solution. It was oval and measured 2·5 × 1·2 × 0·9 cm. One surface was convex and irregularly nodular, the other flattened and slightly concave. The surfaces showed a few fibrous tags, particularly the concave surface, and were yellowish-white except for one glistening white area (0·6 cm. diameter), and by its side a dark grey area (0·3 cm.). The cut surfaces were white, mottled with a few irregular, greyish-brown areas, and faintly granular. On one cut surface was an area of friable brown substance.

Microscopic Examination.—The nodule was bisected. One half was further fixed in 2 per cent. saline formaldehyde and embedded in paraffin; sections were stained by the same methods as in the preceding case. The section has the oval shape with one flattened surface described above, but the convex surface is not nodular. The mass is composed of strands of spindle cells with narrow elongated oval nuclei, which stream in various directions and occupy the periphery of large and small whorls of shorter spindle cells or rounded groups of lozenge-shaped or polygonal cells with larger oval or round nuclei and less abundant cytoplasm. Small whorls of concentrically arranged cells are common. The rounded groups of polygonal cells bear a superficial resemblance to epidermal epithelium.

The nuclei have a deeply stained, slender membrane, an abundant net of delicate fibrils of chromatin, numerous small but conspicuous nodes, and one or more small nucleoli. The nucleus usually occupies between a half and a third of the total area of the polygonal cells. The limits of the cells are usually very ill-defined, but are sharp where the cells are dissociated. The cytoplasm is stained readily; under high powers it has a finely fibrillated appearance, particularly in the elongated spindle cells; but there are no definite fibrils of fibroglia or neuroglia.

There are a few small vessels, with walls composed of delicate collagenous fibres and an internal elastic membrane,

but most of the vessels have a swollen hyaline collagenous wall containing a swollen elastic lamina or laminæ, and there are transitions from partly occluded vessels of this kind to solid hyaline cylinders which are stained diffusely by Weigert's fuchselin. There are a few calcareous spheres, surrounded by a zone of hyaline collagen and elastic laminæ, and evidently formed within occluded vessels.

In the central part of the concave surface is an area where the specimen has evidently been detached. All the rest of the surface is covered by a conspicuous layer of stout laminæ of collagen, each of which is covered by elastic fibrils. The inner laminæ are usually separated to a greater or lesser extent by groups of cells similar to those already described, and in a few places these cells extend right through the fibrous layer to lie upon the surface. Elsewhere the outer laminæ are closely opposed, and very narrow spindle cells lie between them.

The tumour has the characteristic appearances of an endothelioma of the meninges, is covered by dural tissue, and has evidently projected like a mushroom with short stalk from the inner surface of the dural theca. It is a cylindromatous, slightly psammomatous endothelioma of the dura.

FIG. 4.

FIG. 5.

FIG. 6.

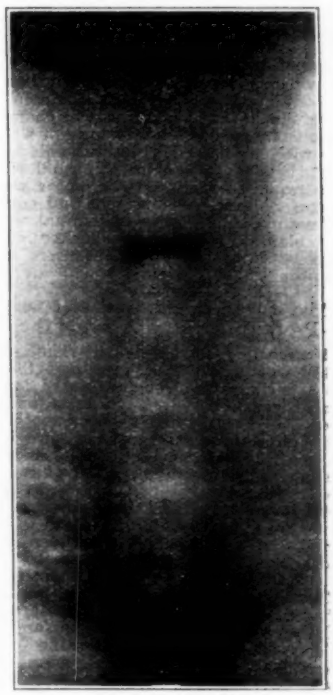

FIG. 4.—Film taken two hours after lipiodol injection in Case 2. The lipiodol is held up at the level of the first thoracic vertebra. The arrows indicate droplets of lipiodol falling to the sacral level.

FIG. 5.—Film taken three-quarters of an hour after lipiodol injection in Case 3. There is delay at the eighth thoracic segment and the lipiodol stream is deviated to the right.

FIG. 6.—Illustrating the appearance of the arrested lipiodol in a case of intramedullary neoplasm.

The Third Case.

Female, aged 56, a widow, first came under my care in February, 1927. She had always enjoyed very good health until two years previously, when she became very worried and run down owing to her husband's illness. Twelve months later he died of tuberculosis. There were two healthy, grown-up children, and there had been no miscarriages. For seven months the patient had suffered from numbness of the feet, particularly of the left, and this had steadily spread upwards to the calves. A month later she complained of cramp-like pain in the left loin and occasionally in the left leg, and also a constant aching pain in the middle of the back, which radiated round to the left side and became worse when in the recumbent position. There was also some weakness and stiffness of the lower limbs. There had been no sphincter trouble of any kind.

The patient was a tall, thin, intelligent woman. There was no evidence of disease in the heart, lungs, or abdomen. The cranial nerves were normal. There was no weakness of the upper limbs, the tendon reflexes were present and equal, and there were no sensory changes. The abdominal reflexes were absent on the left side and present in the upper segment only on the right side. There was slight spasticity of both lower limbs, together with weakness, affecting especially the extensors of the legs and feet. There was no wasting. The knee- and ankle-jerks were exaggerated. These signs were more marked on the left side. Both plantar responses were extensor. Ankle-clonus was not elicited. Sensory changes were marked. A band of hyperæsthesia encircled the waist at the level of the eighth thoracic segment. Sensation to pain, heat, and cold was diminished in the right leg, and delayed in the left leg. There was gross impairment of sense of position in the left foot, but none in the right. The Wassermann reaction in the blood and cerebro-spinal fluid was negative. The cerebro-spinal fluid obtained by lumbar puncture was

clear, not under pressure, and contained an excess of protein and 65 small lymphocytes per c.mm. X ray examination of the spine revealed no abnormality.

Whilst in hospital she became progressively worse, and on March 3rd, 1927, developed retention of urine, which was relieved by catheterisation. On March 5th radiological examination after the injection of 2 c.cm. of lipiodol into the cisterna magna demonstrated the fluid passing down to the level of the eighth thoracic segment, where it was delayed for half an hour; afterwards the lipiodol stream was seen to deviate to the right and to pass down unobstructed to the sacral region (see Fig. 5).

On March 9th laminectomy was performed by Mr. A. J. Walton. On opening the dura a well-defined firm swelling was exposed at the level of the eighth thoracic segment, loosely attached to the leptomeninges and dura on the left side and posterolateral in position. Between the tumour and the dura was a definite bony plaque. The cord itself was flattened and pushed to the right. The general features of the tumour are illustrated in Fig. 3. The patient made a steady and uninterrupted recovery, and within six weeks was able to walk a distance of ten yards without support. She was last seen in November, 1928, when she stated that she was in charge of a large boarding establishment and that, in spite of working hard, she never felt wearied or tired. She was able to walk six miles with ease. She presented no abnormal physical signs. There were no sensory changes or motor weakness, and the deep tendon reflexes were present and equal. The abdominal reflexes over a very lax abdominal wall were not elicited. The plantar response was flexor on both sides. Since recovery from the operation there had been no urinary symptoms.

The specimen removed at operation was examined by Prof. Turnbull, who made the following report:—

Macroscopic Examination.—The specimen (S.D. 485, 1927) was ovoid and measured $2{\cdot}2 \times 1{\cdot}5 \times 0{\cdot}8$ cm. The outer surface was rough, faintly lobulated, greyish-pink flecked with a few dark red areas, and soft, except over an area ($1{\cdot}5 \times 1$ cm.) where it was smooth, yellowish, and hard. The cut surface was granular, greyish-pink flecked with red, and soft, except beneath the smooth area. Here there was a small triangular portion of cancellous bone (0·4 cm. long), with its apex directed inwards.

Microscopic Examination.—Two portions were fixed in 2 per cent. saline formaldehyde; one portion, which included the bone, being subsequently decalcified in nitric acid. Paraffin section were treated as in the previous two cases, and also by Kossa's method.

The tumour resembles that in Case 2 so closely that it is only necessary to describe the points of difference. Veins and arterioles are more numerous, and there are a few areas of recent hæmorrhage. Hyaline collagenous cylinders, evidently derived from blood-vessels, are much more numerous. Most of these contain a central core of calcium, which in cross-section usually shows concentric lamination. The outer surface is ragged and broken, except in one small area where it is covered by a thick membrane composed of collagenous laminæ, each covered by elastic fibres. Definitely within this membrane is a small portion of lamellar bone containing a Haversian space and two Haversian canals. Several of the elastic sheets in the membrane are continued into the bone. Immediately beneath the membrane, and covered laterally and inferiorly by a narrow layer of collagenous and elastic fibres, is a small triangular portion of bone containing many lamellar systems. It contains a few Haversian canals and several large spaces, which contain wide capillaries in a loose-meshed fibrillar, partly fatty marrow.

The bone appears to have developed within the inner part of the dural theca. The tumour is an endothelioma of the meninges attached to the inner surface of the dural theca. It is an extensively cylindromatous and psammomatous endothelioma of the dura.

Diagnosis.

No hard-and-fast rules can be formulated and applied to the diagnosis of leptomeningeoma of the spinal cord. The nature and character of the symptoms and the subsequent course of the disease cannot be accurately separated into definite stages or periods. The symptoms and the physical signs elicited in any particular case must depend on: first, the site of the tumour; secondly, its rate of growth; and, thirdly, the extent of the injury to the spinal cord produced by the growing neoplasm. Subdivision into the three stages of: (1) root pain, (2) Brown-Séquard syndrome, and (3) complete paraplegia with incontinence of urine and fæces, must consequently be regarded as artificial, and can be of no real value in the study of the condition. Before recourse is made to special methods and aids a study should be made of the clinical features available. In surveying these, certain of the features presented by the three cases reported here will be emphasised.

Level of the Lesion.—Learmonth,[1] in an exhaustive study of 60 cases, found that 63·4 per cent. of leptomeningeomas of the spinal cord occurred in the dorsal region. The tumours in the three cases reported here also occurred in the dorsal region of the cord, one in the upper and two in the lower segment.

Age-incidence.—The condition appears to be more prevalent during the middle and later decades of life. The ages of the cases considered here were 50, 48, and 56. Learmouth found that 48 out of 60 occurred between the ages of 30 and 60.

Sex-incidence.—All three cases were females. The literature also discloses a tendency for the condition to affect the female sex. In Learmonth's series 66·7 per cent. were females. Frazier[2] collected a series of similar growths and found that out of 37 cases 26 were females.

Symptomatology.

Pain is the commonest presenting symptom, but should the tumour be situated anteriorly this may be absent or less pronounced than where the tumour is placed posteriorly or in a postero-lateral position. Bennett[3] has recently placed on record four examples demonstrating the variability of the pain, the cases presenting symptoms that suggested osseous, muscular, and ligamentous changes rather than any pathological lesion of the central nervous system. As illustrated by the three cases under review, the pain may be of three types:—

1. *Localised Pain.*—Here the pain, accentuated on movement and accompanied by marked localised tenderness over the spinous process, is situated over the vertebra which is innervated by the segment opposite which the tumour arises and produces its irritating effects. Its presence, therefore, must be regarded as a valuable and important symptom, since it may not only be the earliest indication of a lesion of the cord but may also accurately demonstrate its level. This symptom was a prominent feature in Case 1 and led to the provisional diagnosis of myositis or neuritis. The X ray examination still further obscured the true nature of the condition by revealing the presence of osteo-arthritis of the spine.

2. *Radiating Pain.*—This originates from the pressure of the tumour on the posterior roots; it may be dull and aching but is sometimes described as sharp, shooting, or stabbing, and radiates round the corresponding side of the body. Here also the pain is usually accentuated on sudden movement, and again proves a valuable aid in localising the level of the lesion. It appeared as a prominent symptom in Case 3, although paræsthesia had been present for one month before its onset. A zone of hyperæsthesia may be a manifestation of pressure upon posterior roots and may also indicate the level of the lesion.

3. *Removed Pain.*—This is manifested by the presence of cramp-like pain, frequently accompanied by spasms, in the homolateral lower limb and associated with some degree of numbness and weakness. The explanation of this phenomenon is given by the study of the mechanism of spinal compression by spinal tumours. Purves-Stewart and Riddoch[4] pointed out that the pathological effects of the actual pressure on the cord-elements are very limited, and that the widespread interference with cord function is due to vascular changes setting up what they termed a condition of anoxæmia. This engorgement of the spinal veins below the level of the tumour, resulting in the depletion of the oxygen-supply of that portion of the cord, probably explains the presence of pain, numbness, and weakness in the lower limbs.

These symptoms, as illustrated by the cases reported here, may be present and persist for many months before the onset of more distressing symptoms.

Weakness and Subjective Sensory Symptoms.—Subjective motor disturbance in the form of weakness and stiffness of one limb usually follows other subjective symptoms, but in Case 2 loss of power and stiffness in the left lower limb proved to be the presenting symptom. With the further growth of the tumour the conducting tracts on that side of the cord are interrupted, resulting in a progressive paralysis of the muscles supplied by homolateral segments below the level of the lesion, and a loss of sensation to pain and temperature on the contralateral side. The sense of passive position may be interfered with, but only very rarely is tactile sensibility affected. When one half of the spinal cord is interrupted, the clinical picture known as the Brown-Séquard syndrome may be present. Such a condition, however, is rarely seen, as a paraplegia soon ensues. A "reversed" Brown-Séquard syndrome, where the motor and sensory disturbances are opposite to those described above, is seldom met with. The pressure exerted by the growing tumour affects the extrapyramidal as well as the pyramidal tracts and a paralysis in flexion results. The spasticity is very marked and the rigidity persists during sleep and, as in Cases 1 and 2, spontaneous and painful spasms may be prominent and frequent. When the state of spasticity passes into a condition of flaccidity with absence of superficial and deep reflexes, it is doubtful whether removal of the lesion will lead to a complete recovery, permanent damage having taken place in the tissue of the spinal cord.

Vesical Symptoms.—Sphincter trouble had resulted in each of the three cases reported here before they came to operation. Learmouth, from a careful analysis of his series, concluded that there was little relation between them and either the level of the tumour or its position relative to the cord.

Additional Aids to Diagnosis.

Although the clinical examination, together with the history obtained from the patient, supply the most important data upon which a diagnosis is based, nevertheless valuable confirmatory evidence may be obtained from accessory methods.

1. *Examination of the Cellular Content and Chemical Properties of the Cerebro-spinal Fluid.*—It is generally assumed that the cellular content of the cerebro-spinal fluid below a spinal block produced by a non-inflammatory lesion such as a neoplasm remains unaltered. Such a finding, however, is inconstant and unreliable. An increase in the cellular content was a marked feature of Case 3.

As a further result of engorgement of the spinal vessels below the site of compression, their permeability becomes increased and transudation occurs. The pigment of the altered blood gives the cerebro-spinal fluid below the level of the lesion a characteristic yellow colour known as xanthochromia. Its presence, however, is not constant, and it was absent in the three cases described here. Moreover, it has frequently been recorded in other conditions.

The normal protein content of the cerebro-spinal fluid is approximately 25 mg. per 100 c.cm. Below the site of spinal compression it may be increased up to 2000 mg. per 100 c.cm. This increase in the protein associated with no increase in the cell count was held by Nonne [5] to be strong evidence of the presence of a spinal cord tumour. Similarly, an increase in the glucose and mineral salts may be noted.

The fluid below the site of compression may also show spontaneous coagulation owing to the presence of fibrinogen. This property, along with the presence of xanthochromia and high protein content, combined with a normal or but slightly raised cell count, was first described by Froin,[6] and these signs are collectively designated the "loculation syndrome."

Finally, as pointed out by Purves-Stewart and Riddoch, fluid in an isolated sac of the spinal arachnoid space is separated from the source of any ferments passed into the space from the choroid plexus and the pituitary body.

2. *Study of the Combined Cisternal and Lumbar Puncture.*—Normally the composition of the fluid should be constant throughout the subarachnoid space. When a spinal subarachnoid block is established, the composition becomes altered in the way described above. Ayer [7] elaborated a method by which the fluid above and below the lesion can be studied. Needles connected to manometers are introduced into the cisterna magna and the lumbar region of the space with the patient lying on his side. Stookey [8] and others, following their study of manometric readings in 50 suspected cases of spinal cord tumour, stated that combined lumbar and cistern puncture is indicated when manometric studies from the lumbar puncture alone do not permit of definite conclusions, and that in their series the combined method was only necessary in three instances.

3. *Manometric Studies of Cerebro-spinal Fluid through Lumbar Puncture.*—In 1916 Queckenstedt,[9] by means of lumbar puncture alone, demonstrated that the pressure in the subarachnoid space was raised after compression of the jugular veins in the absence of spinal block, but that when obstruction was present the response to the general methods of raising the general pressure in the space was altered, lessened, or absent. Stookey has emphasised the value of this method in the investigation of spinal cord tumours, and considers the examination incomplete if a manometric study has not been conducted.

4. *Injection of Lipiodol into the Spinal Theca.*—This method of investigation, first introduced by Sicard and Forestier,[10] has provided us with a further valuable aid in the study of spinal cord compression but, as recently emphasised by Armour,[11] its use should in no way usurp the place of careful and repeated systematic clinical examinations of the patient.

With the patient sitting upright, 2 c.cm. of lipiodol are injected into the cisterna magna. In the absence of a block the fluid falls to the lower end of the spinal theca in two to seven minutes. When the offending lesion has established a subarachnoid block, the lipiodol may be completely arrested above the site of the tumour for a long time, and later commences to trickle down to the lumbo-sacral portion of the sac. Figs. 4 and 5 illustrate the results obtained in the investigation of Cases 2 and 3 by this method. The value of lipiodol is greatest when the level of its arrest corresponds with the level of the tumour, as determined clinically by sensory changes. In addition, the outline of the lower border of the shadow of the arrested fluid may suggest the nature of the tumour. Thus in a case of extramedullary compression the lower end of the shadow may taper to a thin point where the lipiodol slowly trickles through (Figs. 4 and 5), whereas in cases of intramedullary growths the lower border of the arrested fluid assumes a more uniform outline, which tends to be crescentic with its concavity downwards (Fig. 6).

The injection can also be made into the lower end of the spinal theca by lumbar puncture. This method is simple and free from the risks entailed in cisternal injection, but it requires a special table and has a further disadvantage in that many patients cannot tolerate the reclining position which is necessitated by the test for a period of 10 to 20 minutes.

The use of "light lipiodol" has not gained universal favour, and it possesses no great advantages over the methods already described.

Various complications have been attributed to the use of lipiodol in the investigation of spinal compression from extramedullary tumours. After the injection in Case 2 the symptoms became rapidly worse and complete paralysis of both lower limbs, together with incontinence of both urine and fæces, ensued. Lipiodol, therefore, should not be used unless the patient can be operated on soon after, should necessity arise.

When such conditions as meningovascular syphilis, intramedullary neoplasm, and syringomyelia, together with pathological changes in the vertebræ have been excluded, and recourse to the special methods defined above has established the diagnosis of leptomeningeoma of the spinal cord, the condition becomes

a surgical emergency and operative procedure should be adopted immediately. If operation is unduly delayed permanent degenerative changes may occur and lead to irrecoverable damage to the conducting fibres within the cord.

I am indebted to Prof. Hubert M. Turnbull and Mr. A. J. Walton for their help in elucidating my cases.

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METHODS OF TRACHEAL INSUFFLATION

AND INTUBATION INHALATION OF ANÆSTHETICS.

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WHEN Meltzer and Auer experimented upon animals in 1909 the advantages claimed by them for the method of tracheal insufflation were, first and foremost, that it was a safety method which would prevent the inhalation of fluid or foreign substances into the air passages; and, secondly, that an animal could be kept alive for a prolonged period when both pleuræ were opened, thus proving it to be a very efficient means of performing artificial respiration.

Complete and Partial Insufflation.

How far, in actual present-day practice, this is a safety method is a subject for serious examination. I propose to advocate strongly the adoption of a modified terminology, which is essential if students and others who take up this method are to be made aware of the very important differing conditions which exist in what I shall refer to as complete tracheal insufflation and partial tracheal insufflation. Complete tracheal insufflation means the passage of air or gas and oxygen into the trachea in such quantity that the patient's tidal capacity is more than satisfied, and that even during the inspiratory phase there is an outgoing current through the glottis. This is the Meltzer-Auer method and is the only one to which the term "safety" can correctly be applied, for if these conditions are not fulfilled and the patient can, during inspiration, draw air through the glottis, fluid may certainly be aspirated with it. Partial tracheal insufflation implies that an amount of air or gas and oxygen less in volume than the tidal capacity is passed in, allowing the patient to make up the deficiency by a to-and-fro movement of air through the glottis. Unaided, this is not a perfectly safe method; the same precautions against the aspiration of fluid must be taken as in an ordinary administration, and provision must be made to counteract any tendency to obstruction by the base of the tongue, or by any other impediment to a free airway. The patient is, in fact, at a disadvantage, because the normal protective reflex mechanism against inhalation of fluid or solid particles, present during light anæsthesia, is hampered by the presence of the catheter between the cords, and the epiglottis is out of action. Coughing consists of violent expiratory efforts followed by a long-drawn and equally violent inspiration, and it is at this moment that aspiration is most likely to occur. When once movement is set up in the larynx the catheter acts as a strong irritant until the reflex can be abolished. Partial insufflation is the method commonly in use, and its imperfect protection against inhalation has unfortunately been demonstrated in practice.

The tidal capacity is that amount of air which passes in and out of the chest during respiration. It corresponds with the difference in cubic content of the respiratory air-space between the range of expansion and contraction of the chest. It is indicated by the movement of a bag of gas or air when the face-mask is closely applied. It varies within wide limits, both in the same and in different subjects under varying conditions. It usually decreases in amount as the rate of breathing increases, and vice versa. The average amount of the tidal capacity is given in text-books as 500 c.cm., but it is sometimes very much more or, with quiet breathing and small chest capacity, much less. The rate of respiration during anæsthesia under favourable conditions may be little above the normal, but frequencies of 30 or more are met with. To calculate in litres per minute the rate of flow necessary for complete insufflation the tidal capacity must be multiplied by the frequency of respiration per minute, and the quotient must then be doubled, because the flow is continuous during the expiration phase and an excess must be provided for.

It is sufficient for my purpose to show that a very large flow may be required and that few, if any, of the small air pumps now in use are capable of putting up such a performance. A large foot-bellows will give an adequate flow, and it is noteworthy that this is actually a very good instrument to use, for with it a perfect artificial respiration may be maintained, increasing pressure and flow during inspiration and decreasing during expiration. An anæsthetist's equipment should provide for maximum requirements, and a good mechanical pump should be able to generate a large volume of air at low pressure.

The Size of the Catheter.

It is impossible at low pressure to pass a large volume of air through a catheter with a small bore, and if the external dimension is too great it will act as a block against the return flow. The theoretical ideal is that the bore of the catheter should be a little less than the surrounding space in the trachea, so that a large volume of air can pass in at low pressure and return with equal freedom, allowing normal chest movements and the variation in cubic content which they involve. It is important to realise that the manometer indicates the pressure inside the catheter, and that this corresponds to that in the lungs only when there is a block against the return, or when the ingoing channel equals the outgoing. When the catheter bore is small in comparison with the surrounding space the manometer reading will tend to be higher than the actual pressure in the trachea, unless a block is put on the return.

Practical Applications.

Complete insufflation, although protective against inhalation dangers, is of little use in operations on the mouth which involve bleeding, on account of the impossible situation set up by the projection of blood and anæsthetic vapour in the face of the operator. It may be used in ordinary work, but only at very low pressure, or with variation in pressure corresponding to the respiratory phases. Low pressure complete insufflation requires an exact choice of catheters. Its real practical importance is that it should always be possible to convert a partial into a complete insufflation if fluid is ejected into the throat. Thus only will the patient be secure against aspiration until the pharynx can be cleared. It follows that in mouth operations some other method is essential, and the one commonly employed is the double catheter and pharyngeal pack or the single intubation inhalation method. When the double catheter is used the second, or exhaust,

must be as large as possible, and the inlet catheter will on this account be smaller than it would be in the case of an ideal single catheter administration. The insufflation will, therefore, almost certainly be partial, and to-and-fro breathing will take place through the exhaust. In fact, all variation in chest capacity must necessarily take place through its channel. Now the largest possible lumen in these circumstances can only be but a poor airway compared with the normal, and the use of double catheters can only be looked on as a compromise necessitated by the circumstances of the operation, and in no way desirable, or superior to, the single catheter in ordinary cases. They are necessary whenever the anæsthetist has not complete control over the conditions prevailing in the upper air passages, for in a partial insufflation saliva can always be aspirated if the position of the head is favourable, and a mouth airway by no means provides a channel for breathing in all circumstances.

In the alternative method of intubation inhalation a large single tube is passed into the trachea and the pharynx is packed round it. The patient breathes through its lumen, and anæsthetic vapour is added to the ingoing tidal air by means of an adaptor on the end of the catheter. This is also a compromise and, unless the bore is large, the airway is obviously restricted compared with the normal. The frictional resistance to the passage of air through small tubes is considerable, and imposes effort on the patient. Signs of anoxæmia may develop, and it is always useful in this method to add oxygen to the ingoing air. Slow, deep breathing indicates high carbon dioxide tension. If anyone doubts the exertion involved in breathing through small tubes, let them make a personal experiment.

Now although, when the pharynx is packed, the patient is safe in respect to fluid from above, it must be remembered that fluid may be ejected from the stomach below the pack and be dammed in the neighbourhood of the glottis. It is essential, therefore, to maintain an even depth of anæsthesia and, if vomiting should threaten, the anæsthetist must be alert to deal with it.

Tracheal insufflation of gas and oxygen is a common procedure. It is evident that only with complete insufflation is it possible to maintain anæsthesia; for how, if the patient is breathing air as well, could such a mixture be effective? The large amount of mixed gases required for a complete insufflation makes this method unpractical. It follows that most of these administrations are partial, with the addition of ether, and if the gases are led through an ether bottle the procedure is practically an ether administration, using gas and oxygen as a vehicle.

Partial insufflation of gas and oxygen can be made practical by the use of a rebreathing bag, and this is a good method. Meltzer and Auer's second discovery is applied in intrathoracic surgery. Before closing the chest the lung has to be expanded so that it will fill the pleural cavity. The negative pressure in the pleura at full inspiration is given as 30 mm. of mercury, and the safety-valve is set to blow off at this pressure. If the catheter has been correctly chosen the lung may be expanded and held by a complete insufflation at this pressure without any interference with the return flow, but if, when the manometer shows this pressure the lung fails to expand, it shows that the catheter is too small, and a block must be put on the return flow. This may be done by applying an ordinary rubber face-mask, of which the aperture is occluded by a suitable metal fitting carrying a tap. This tap can be adjusted so that air may be continuously passed, while sufficient is retained in the lungs to distend them. Pressure on the lungs cannot be maintained for more than a short period. With the fixed chest alveolar ventilation depends entirely on diffusion and is inadequate. The alveolar capillary pressure will be very much lower than the air pressure; that in the large veins is normally only a few millimetres of mercury and, during inspiration, it tends to be negative. High pressure interferes with the circulation, and the venous return to the right auricle is impeded. This results in decreased output by the left ventricle, and the pulse becomes small. On releasing the pressure the pulse regains its former volume. This may be demonstrated on any case. High pressure insufflation is on this account bad practice, and is to be used only as occasion demands, and then only for a short period.

Occurrence of Apnœa.

It is frequently stated that apnœa is commonly produced by this method. Physiological apnœa is that condition in which, owing to excessive alveolar ventilation, the tension of carbon dioxide in the blood falls so low that it fails to excite the respiratory centre. There is another cause of stoppage of the breathing, for the centre may be rendered inexcitable to a normal amount of carbon dioxide, and this can be done very easily by drugs such as morphia, ether, and chloroform. This stoppage can be produced any time by ether and is sometimes seen when a patient has been difficult to relax and ether has been liberally used. When relaxation is attained the breathing ceases, or almost ceases. If ether is lessened or discontinued and insufflation of air increased the breathing will gradually be resumed at normal depth, thus demonstrating the cause of the stoppage. Tracheal ventilation in the absence of exaggerated chest movements does not lead to excessive alveolar ventilation. The characteristic features of this method are quiet breathing and the perfect colour of the patient. Normal breathing and good colour indicate that carbon dioxide tension is normal and that the depth of respiration is sufficient to carry oxygen to the alveolar air. There is, therefore, in ordinary circumstances no reason why true apnœa should occur, and I certainly have never been troubled by it. Any stoppage which can be treated by continued insufflation is certainly due to high ether tension and not to deficiency of carbon dioxide. It is possible that the Hering-Breuer reflex may contribute to a temporary hold-up in respiration, especially at the early stage mentioned above. Distension of the alveolar wall reflexly inhibits inspiration through the vagus. This condition is not an apnœa, but a prolonged respiratory effort in one phase.

Warming the Air.

The question of warming the air is, I hope, now settled. Patients receive the air at about room temperature, and this is what they require. It is odd that the most important consideration is generally overlooked; when air is insufflated it impinges on the moist surfaces of the air passages, and unless it is saturated with water vapour evaporation from the moist surface is inevitable. Heat is absorbed in the process of evaporation and is extracted from the surface. This is why the pharynx sometimes feels cold and the tongue may get dry. The cooling is proportional to the volume and rate of flow of the air current. It is the strongest argument which can be brought forward against large volume insufflation. If it is to be avoided the air must be moistened rather than heated. Fortunately, many thousands of administrations by many anæsthetists tend to show that there is no method more free from respiratory troubles than the one under consideration. If anyone is in doubt whether an administration is complete or partial, let a small flake of cotton-wool be placed in the pharynx or at the mouth of the airway, and this will show which way the wind blows.

A HOSPITAL'S COFFEE TAVERN.—Some years ago the London Midland and Scottish Railway presented the Euston Coffee Tavern at Crewe for the benefit of the Crewe Memorial Hospital. The tavern, which is managed by a committee of the hospital staff, has handed over £500 as the profits of the past year. Several thousands of pounds have now been paid to the hospital from this source.

A NOTE ON THE FREQUENCY OF SKI-ING ACCIDENTS.

By Dr. W. KNOLL,
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THERE recently appeared in *Punch* a humorous drawing designed to call attention to the frequency of injuries due to winter sports, especially ski-running. It may therefore be of interest to your readers to know what this frequency is in fact, and the following note sets out our experience at the winter resort of Arosa in the Swiss Alps, the data being complete up to the end of January, 1929.

The first communications on ski-ing injuries were made by Steinmann 1911, Oberst 1911, and Bernhard (St. Moritz) 1913. Then followed v. Saar, Mandl, Staehelin, Likint, Drevermann, Genewein, and Hug (references given at the end). Most of these simply narrate cases. Only Hug put together some figures on frequency, using material not observed by himself, but collected from ten insurance companies. I have had opportunity within the last six winter seasons in Arosa of observing personally 430 injuries occurring during ski-running. In addition, I have sent round a questionary for 1927–28 addressed to the ski-ing instructors to ascertain how many accidents occurred during practice and on conducted tours; these results have been published (reference at end).

Causative Factors.

From this material the salient facts are as follows. The kind and frequency of injuries to ski-runners undoubtedly depend on the degree in which they have mastered ski-ing, in other words, on good technique. Medical experience in general as well as the replies to the questionary addressed to instructors show that poor runners run a greater risk than middling runners, and middling runners a greater risk than really good runners. This observation conflicts with the conclusions drawn by Hug from material supplied by the accident insurance companies, according to which the expert runs an increased risk of accident. The discrepancy arises from the fact that instructors and guides make a rule of insuring, while only some 10 per cent. of the other members of the Swiss Ski Club are insured against accident. For the rest the good runners in consequence of their knowledge of the country and of weather conditions, together with their experience in the various kinds of snow get out of difficult situations without injury more easily than those with less judgment and experience. The risk of accident therefore steadily diminishes in proportion to the mastery of technique.

Apart from technique there are other circumstances which affect the frequency of accidents. One is imperfect visibility, especially in early morning and late evening, but also in dazzling sunlight, which makes it impossible for the runner to orientate himself even at a short distance. Then only very careful running can help him along with observance of every precautionary measure. In point of fact a disproportionate number of accidents are due to such circumstances. Another important factor is variation in the quality of the snow. It often happens that the runner suddenly passes from a crusted surface into deep powdery snow, and if his technique is not up to meeting the new conditions at once and correctly a fall is inevitable, although even then a fall rarely leads to accident. Furthermore, the precise way in which the fall happens is very important for the resulting injury; he who understands how to fall will run much less risk, even in severe falls, than he who does not understand. Masters in this art are not the grown-ups, but the children, who simply let themselves fall without making any effort to prevent it. This counts for much on a hard surface, which takes first place in responsibility for various forms of injury. For example, the torsion fractures of the metacarpal bones, described as very frequent in Central Switzerland from a fall on the hand which still holds the stick, only occur with us under quite definite conditions—namely, when for long no snow has fallen, when the slopes have become very hard, and when the tracks are iced. Then elderly runners whose technique is not very good are specially liable to incur severe injuries, particularly fractures and sprains in the region of the upper limbs.

The Common Injuries.

The large majority of all ski-ing injuries, of course, concern the lower limbs. Here, again, there is a definite correlation with changing snow conditions; when there is deep powdery snow sprains and tears of ligaments in the knee and ankle-joints predominate, whilst on a hard surface fractures of one or both legs occur much more frequently. The commonest leg injury is the torsion fracture of the fibula at its lower end. Supination fractures of the outer ankle occur, the method of production being typical and generally the result of the Christiania swing. Torsions occur more frequently in stemming and Telemark turning. In this connexion it may be mentioned the interesting fact that the injury often precedes the fall. The fall therefore is not its consequence but its cause. In a great number of these cases it is torsion of the body on a leg which is more or less fixed by the ski-binding or by the snow that is the immediate cause of the injury; a fact which is well illustrated by the case of a runner who, when lying on a slope where he was held fast, produced a torsion fracture of his fibula by a smart turn of his body.

Some difference occurs as between the sexes, inasmuch as the frequency of knee distorsion, which consists essentially in a tear (seldom in a complete separation) of the collateral tibial ligament with consequent marked abduction of the leg, largely preponderates in women—48·0 per cent. compared with 19·7 per cent. in men. On the other hand, the ankles were damaged among men in the proportion of 54·2 per cent. to 34·5 in women. The different relation of the axes of the thigh and leg, which allows in the woman much severer loading of the knee in the direction of genu valgum, may be regarded as the reason for his difference.

Prophylaxis.

On an analysis of the whole material 10·4 per cent. of all injuries concern the head and trunk, 14·8 per cent. the upper limbs, the whole of the remaining 74·8 per cent. falling on the lower extremities. Accidents attributable to equipment itself, skis, or sticks, are very uncommon with us because the favourable snow conditions do not give occasion for them. Yet I have among my material a small number of contusions from falling on the points of the ski and some stabs and contusions due to sticks. The great majority of all injuries occurred during the downhill run from disturbance of coördinated movement between the ski and the body, with resulting disturbance of equilibrium. The form and tightness of the binding certainly is a contributing factor, although in the absence of good material for comparison it would be impossible as yet to say whether this or that binding is more favourable for the avoidance of injuries in falling. Much weight is certainly to be laid on equipment. Bad equipment produces a greater tendency to fall, and frequent falls lead to local and general fatigue which results in a greater risk of accident. This must also be considered in the choice of participants for a tour, for when a man with little technical experience makes a considerable tour with good runners he incurs much more risk than if all the runners are about equally good. The poor runner will already be unduly tired by the speed of the initial climb, and therefore runs increased danger of fatigue and fall on the descent. Most accidents happen in fact to people who have set themselves too difficult a task and have undertaken tours of which they were not yet capable.

That good runners incur a very small risk is also the experience of our Swiss ski-running competitions which I have medically inspected since 1920, during which time I have seen at least 1000 long-distance competitors and some 1300 military patrols. Among them not a single severe accident occurred in spite of the severe demands made on them and the unfavourable conditions of snow and course. This is also confirmed from the sporting side by Erb as ski-ing teacher and instructor of a Swiss mountain brigade.

The practical deduction from all this is that we should so develop our ski-ing technique that we can venture even on long and difficult tours with diminished risk of danger. The equipment must be carefully seen to before every such tour. Difficult tours should always be made with a guide, and due consideration should be given to the experience of mountaineering, which has in England especially such prominent advocates. The risk of accident will then be brought down to a very low level, as may be seen from the statistics of ski-instructors already mentioned, who only had seven accidents in 6000 lessons, say 1·2 per cent., an almost negligible figure. Of these, six occurred to poor runners, only one to a good runner. On tours in the same period 1900 persons were conducted, of whom nine suffered injury—one of these was a good runner, one a middling runner, and the remainder were poor runners. These figures illustrate clearly the conditions which lead to increased risk on the part of poor runners, but they show also that reasonably conducted ski-ing carries with it no particularly high risk of injury. Anyone who is afraid of a possible accident is no sportsman; anyone who provokes an accident by negligence is also at heart no sportsman.

The figures given above are valid for Arosa as a type of Swiss winter-sport resort. They are naturally not to be transferred without adjustment to other climates and other types of hilly country, but must be assessed elsewhere with due regard to local conditions. It would be very desirable to obtain without delay from other resorts similar collections of the largest possible material. For the Swiss high alps the acts may be considered closed.

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Clinical and Laboratory Notes.

NOTE ON A METHOD OF RECORDING THE PHYSICAL SIGNS IN RHEUMATIC CARDITIS.

By M. O. Raven, D.M. Oxf., M.R.C.P. Lond.,

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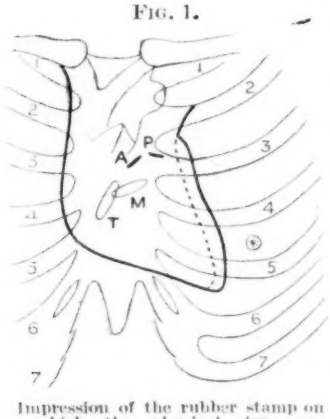
In the institutional treatment of pulmonary tuberculosis it has long been the custom to record the pulmonary physical signs by diagrammatic methods, whereby they can easily be understood by medical men. The method allows one medical man to appreciate the signs found by another, and also provides for a series of diagrammatic representations of those signs at regular intervals of time, so that at the end of the series a fairly accurate idea of their progress can be obtained.

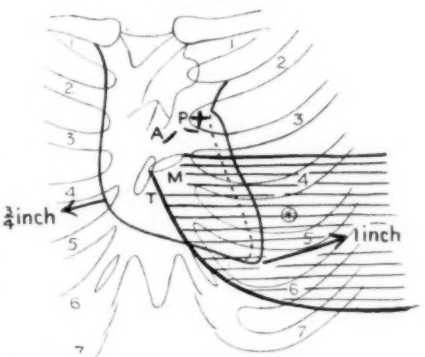
Fig. 1.



Impression of the rubber stamp on which the physical signs are recorded.

Rheumatic heart disease is likely to come more and more under institutional treatment during the next few years, and some similar diagrammatic method of recording cardiac physical signs will probably become desirable. While working in a small ward at St. Mary's Home, Broadstairs—a ward devoted mainly to treatment of rheumatic disease in childhood—I became most dissatisfied with the methods I had of keeping a serial record of cardiac physical signs in any child, and I therefore adopted a diagrammatic method. Messrs. E. M. Richford, 40, Cheapside, London, E.C., constructed for me a rubber stamp the impression of which is shown in Fig. 1. This impression, adapted from a diagram in Cunningham's "Manual of Anatomy," enables me to record the physical signs given by the rheumatic heart from month to month, together with brief accompanying notes on special symptoms and signs, such as pallor, tonsillitis, or sinus arrhythmia.

Fig. 2.

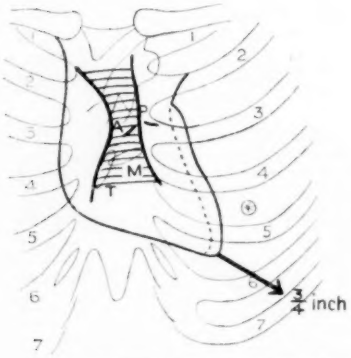


Mitral regurgitation; the murmur is conducted to the axilla. Apex-beat 1 inch displaced to the left and in the fifth intercostal space. Right border of heart ¾ inch dilated. Pulmonary second sound accentuated.

The three accompanying diagrams illustrate my method, which has saved me much time and uncertainty in my estimate of clinical progress. (Figs. 2, 3, and 4.) The left nipple and the right sternal margin being shown, it is a simple matter to indicate the the positions of the heart-borders by arrows with the number of inches of dilatation attached to them; the position of the apex-beat is similarly shown in the proper left intercostal space. Abnormal auscultatory signs may be mapped out, regurgitant murmurs, whether mitral or aortic, being horizontally shaded and obstructive bruits vertically shaded; the areas shaded correspond with the areas of audibility. An accentuated sound is marked by the sign +. Diastolic mitral murmurs—variations in which are of such

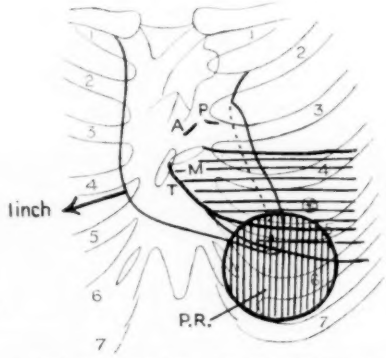
especial prognostic significance in relation to mitral stenosis in later life—vary so much in their time-relation and also with the posture of the patient in the supine position (R), in the left lateral position (L), or only after exertion (X). Thus a mitral murmur marked MLX will mean that a mid-diastolic bruit is

FIG. 3.



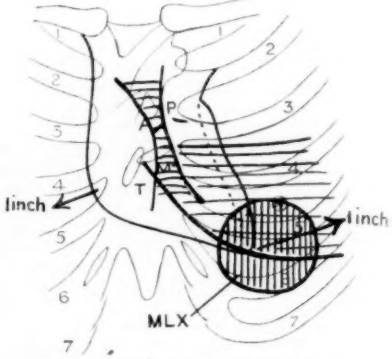
Aortic regurgitation; murmur conducted as shown. Apex-beat in sixth space (hypertrophy of left ventricle) and ¾ inch to left of nipple line.

FIG. 4.



Mitral regurgitation. Mitral obstruction. P.R. indicates a presystolic bruit heard in the supine position. Right border of heart 1 inch displaced to right of right sternal margin.

FIG. 5.



Summary of periodical examination in a complex case: No pallor; tonsils large and ragged; no chorea; evening temp. 98·4° F.; pulse 96; slight sinus arrhythmia; up for two hours daily.

(especially after exertion) that I append to the marking of the murmur letters that denote whether the murmur is heard early in diastole (E), in mid-diastole (M), or as a presystolic bruit (P), and whether heard at the area indicated in the left lateral position only after physical exertion. Finally, I include (Fig. 5) an example of notes summarising a periodical examination in a complex case.

NOTE ON THE USE OF INTRAVENOUS SODIUM BICARBONATE SOLUTION IN THE TREATMENT OF BLACKWATER FEVER.

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AND
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AFTER the case of blackwater fever[1] we reported last autumn, where the patient came into hospital in extremis and was only saved by the transfusion of whole blood, we came to the conclusion that in all future cases it would be advantageous to render the urine alkaline as early as possible, if by so doing we could cut short the duration of the attack and obviate suppression of urine. We were influenced by the case reported by H. M. Hanschell[2] in which the patient had been given intravenously 20 oz. of sodium bicarbonate solution (strength grs. 150 to the pint), within one hour of being seen by the doctor with the result that the impending suppression of urine was prevented, diuresis promoted, and the attack apparently curtailed. The work of S. L. Baker and E. C. Dodds[3] supports this method of treatment in all cases of hæmoglobinuria. They state that:—

> "It (the treatment) should be such as will reduce the factors leading to precipitation of the pigment in the kidney tubules; these factors are seen to be acidity and salt concentration of the urine. Alkaline diuretics or transfusion of sodium bicarbonate solution as soon as possible should tend to minimise the hæmoglobin precipitation of the tubules."

We have recently had two cases of blackwater fever in which we were able to try this method. The histories are briefly as follows:—

CASE 1.—European male, aged 56, had been in Kenya Colony for 30 years and had had four previous attacks of blackwater fever, the first in 1900 and the last in 1919. He gave a history of frequent attacks of subtertian malaria in the past, but more recently had had no definite attacks of fever. He was an irregular quinine taker. The day before admission to the Hospital for Tropical Diseases he had felt "off colour." Suspecting himself to be suffering from an attack of malaria he took quinine grs. x. at 10 A.M. and grs. 5 at noon on the succeeding day (day of admission). After the second dose of quinine he passed dark-coloured urine, was slightly jaundiced, and perspired freely. Recognising the condition the patient sent for a doctor, who ordered his immediate removal to hospital. When he was admitted at 7 P.M. his temperature was 101° F., his pulse-rate 110, and his respiration-rate 20. A blood count was immediately taken and he was found to have 4,800,000 red cells, 6000 white cells, and a hæmoglobin percentage of 85. No parasites were seen, nor was there any evidence of corpuscular degeneration. His urine had a specific gravity of 1008, and a faintly acid reaction; it contained a quantity of albumin and scanty red amorphous casts, but no erythrocytes. The spectroscope showed the bands of oxyhæmoglobin. The patient complained of intense thirst, had a dry and coated tongue, and an icteric tinge of the conjunctivæ, face, limbs, and trunk, and his spleen was palpable one and a half inches below the costal margin. The liver was enlarged downwards and was tender. Owing to the prompt action of his medical adviser the general condition was fair on admission.

It was decided to give sodium bicarbonate solution intravenously as soon as possible. At 8.30 P.M. (one and a half hours after admission) the patient had a rigor, after which he was given 10 oz. of sodium bicarbonate solution followed immediately by 8 oz. of 5 per cent. glucose solution. Sleep then followed. Before transfusion with sodium bicarbonate 17 oz. of urine had been passed, and in the eight succeeding hours 36 oz. more. The urine passed after transfusion was deeper in colour, this being undoubtedly due to the rigor and hæmolysis which had occurred earlier in the evening. Twenty-four hours later, the urine being still very dark in colour although the quantity passed was good, intravenous transfusion was repeated with 7 oz. of sodium bicarbonate solution followed by 4 oz. of 5 per cent. glucose solution. The total urine passed in the 24 hours was 56 oz. followed by a further 42 oz. during the next night. After the second transfusion the urine started to clear, although the patient complained of some pain and irritability on micturition, and within 46 hours of the onset the appearance of the urine had become perfectly normal. After the first day the temperature fell to normal and no further pyrexia occurred. Icterus persisted for four days in all, and on the fifth day the spleen was no longer palpable. In spite of the severity of this, the patient's fifth attack, he made an uninterrupted

[1] THE LANCET, 1928, ii., 645.
[2] Trans. Roy. Soc. Trop. Med. and Hyg., 1926, xix., 188.
[3] Brit. Jour. Exper. Path., 1925, vi., 247.

recovery, and his red cells never fell below 4,260,000 per c.mm. with a hæmoglobin percentage of 85. No malarial parasites were ever seen in the blood films during the disease, but, following our routine, the patient was given treatment with plasmoquine compound when he had fully recovered from the attack of blackwater fever. As is usual in these cases, the patient was kept on a fluid diet, with grs. 5 of sodium bicarbonate added to each feed.

CASE 2.—European male aged 28, had returned five weeks previously from Nigeria and was an irregular quinine taker. Feeling feverish and having vomiting, pain in the loins, enlarged spleen, and diarrhœa, he saw a consultant, who diagnosed the case as malaria and sent him to the Hospital for Tropical Diseases. He was admitted that evening, and on examination was markedly icteric, had an enlarged spleen palpable one inch below the costal margin, pain and tenderness over the lumbar region, and a slight rise of temperature. His blood count showed 4,800,000 red cells; hæmoglobin 85 per cent., and 6000 white cells. Scanty subtertian rings were present in the film, but no corpuscular degeneration was observed, and the urine was normal. The condition being recognised as a pre-blackwater stage, the patient was kept strictly to bed and put on a fluid diet with sodium bicarbonate in all feeds.

Next day his condition was greatly improved and plasmoquine compound, one tablet twice daily, was ordered. On the following day, instead of the two grains of quinine contained in the compound plasmoquine tablets, he was given one dose at 6 A.M. of quinine hydrochloride, grs. 5. His general condition had so much improved that this increase appeared to be warranted. At 10 A.M., however, he passed urine dark in colour and at 12.30 P.M. definite blackwater supervened. This urine had a specific gravity of 1012, an acid reaction, and contained much albumin. Scanty red amorphous casts were present. In a blood film taken at this time no parasites and no corpuscular degenerations were seen. The urine showed the bands of oxyhæmoglobin in the spectroscope. As in the previous case, 10 oz. of sodium bicarbonate solution, followed by 4 oz. of 5 per cent. glucose solution, were given intravenously at 4.30 P.M. Immediately after the transfusion the patient had a rigor with a rise of temperature to 105·4° F., but this had fallen to 102° F. by 10 P.M. Again, as in Case 1, the urine subsequently passed was much deeper in colour, and reached its deepest tint by midnight when it was, however, strongly alkaline in reaction. As the patient was vomiting persistently rectal salines with glucose were given six-hourly, and tinct. iodi. ℥ i. dos·s by mouth and gr. 1/6 of morphia hypodermically were also given.

Next day the temperature was still 100°–102° F. and vomiting persisted. The kidneys were, however, functioning well and 69 oz. of urine were passed in the 24 hours. On the following day the temperature fell to normal at noon, jaundice was less marked, vomiting had ceased since 2 A.M., and at 4 P.M. the urine passed was quite clear, exactly 51¼ hours after the onset of the blackwater. Plasmoquine compound was resumed later in small doses and the patient made an uninterrupted recovery.

The blood count in this case fell as low as 2,100,000 red cells with a hæmoglobin percentage of 50 at the time of cessation of the blackwater, but rapidly regenerated and was normal three weeks later. The spleen was no longer palpable three days after the attack began.

Comments.

1. Both cases were negative to tests for paroxysmal hæmoglobinuria.

2. As both patients were of continental nationality and accustomed to alcohol, champagne was given daily in small quantities without adverse effects.

3. Case 1 had two intravenous transfusions, and even though he was an older man and had had in addition the shaking and disturbance of an ambulance journey at the height of the attack, his urine cleared more rapidly than did that of Case 2, and he did not have such severe hæmolysis. In his case the second transfusion, indicated on account of the subnormal temperature and lack of appreciable improvement in the urine, may have been the determining factor in obviating the persistence of the hæmolytic process. In Case 2 the urine took longer to clear and there was a more severe hæmolysis, but only one transfusion was given. The second transfusion was withheld, as the temperature was approaching normal and rectal salines were being well retained.

4. Both cases gave a negative result to the Wassermann test, and there were no signs of any intercurrent disease.

5. Judging from the results of these two cases it appears that immediate transfusion with sodium bicarbonate solution is indicated in all cases of blackwater fever to curtail the duration of the attack, to prevent blockage of the kidney tubules, and to avoid suppression of urine.

6. More than one transfusion may be needed and should be given when there is no appreciable improvement within the first 24 hours. The need for further transfusions should be judged by the progress of the case.

7. Although rigors and further hæmolyses may occur after transfusion the effect on the urinary system fully justifies the measure, but should signs of anoxæmia appear blood transfusion must be employed instead, and this must be from a donor who is not taking quinine.

In conclusion, our thanks are due to Dr. P. H. Manson-Bahr for permission to publish these cases, and to Dr. H. B. Newham, Dr. P. H. Martin, and Mr. F. W. Foster for carrying out the pathological investigations.

Medical Societies.

ROYAL SOCIETY OF MEDICINE.

COMBINED SECTIONS OF WAR AND SURGERY.

AT a meeting of these two Sections on Feb. 6th, Sir HOLBURT WARING being in the chair, Group-Captain H. V. WELLS opened a discussion on the importance of

EARLY DIAGNOSIS IN TREATING SPINAL INJURIES.

The diagnosis of serious injury to the spinal column following an aeroplane crash, he said, was a matter of much importance, not only in the Air Force, but to the medical profession generally, especially remembering the increase taking place in civilian flying. The chief difficulty naturally arose in connexion with cases in which obvious signs and symptoms were lacking, where fracture of a vertebral body was not immediately followed by apparent grave involvement of cord or nerves. In so-called "missed cases" it was found that weeks, even months, after a crash, spinal curvature or definite neuritis supervened, and a skiagram taken at this remote date showed what the injury was. At the time of the mishap perhaps all that had been reported was a bruising or a straining of the muscles of the back, the only attention given immediately after the accident having been a few days in bed and some massage. After weeks back at work, the man perhaps reported shooting pains in the back, or an inability to straighten himself painlessly.

He divided these fractures into "upper" and "lower." The former were in the upper flexible part of the spinal column, the latter in the more rigid lower region. Fractures in the upper region were brought about by the spine being forcibly bent upon itself; the head was forced forwards upon the curved upper spine, and the maximum force of compression was most often borne by the second or third dorsal vertebra. The fact of the pilot being secured in the plane by a belt was not now thought to contribute to the injury, as it was sufficiently loose to allow of "play," and was only intended to prevent the man from falling out. Fractures in the lower region were, he said, produced by the weight of head and chest being borne by the lumbar spine at the moment of impact, the power of the impulse being reinforced by the rebound being transmitted through the lower limbs. During the apprehension as to what was going to happen, the legs were braced against the rudder-bar, and so the force of impact at the moment of the accident was concentrated on the lumbar spine. The special type of fracture being discussed was the compression or crush fracture, one involving only the vertebral body. The cancellous tissue suffered

crushing, and apparently the spinal column sprang back after the blow.

The patient merely complained of a stiffness or a pain in the back, and there appeared to be no displacement in the spinal line, the reflexes being normal. Strain of the back muscles was usually diagnosed by the medical officer, and the treatment was directed accordingly. Perhaps examination by X rays was not deemed necessary. Only later, when rarefaction had set in, a yielding of the fractured vertebræ was the extent of the injury disclosed. Obviously the spine should be subjected to X rays in every case of accident to the spine, though admittedly at any early stage examination of such a skiagram it might reveal nothing abnormal. Therefore, reliance must be placed on the history and the presence or absence of pain. The medical officer should ascertain the angle and probable speed at which the craft struck the ground; if the propeller and leading edges of the plane were much damaged, it could be assumed that there was enough force of impact to damage the vertebral column. It was not always safe to rely on the presence of pain in the diagnosis. Many patients who had had flying accidents had had definite pain in the lumbar region for varying periods, with a site of maximum tenderness over a particular vertebra. All those recovered without residual symptoms. It was considered that they had had compression without fracture.

It had been suggested, Group-Captain Wells said, that severe compression might cause such a bone lesion that absorption of bony tissue ensued after a period, and he asked whether there were any means of detecting this. Could such a danger be avoided by giving calcium vitamins, or carrying out a course of endocrine therapy? The X rays seemed only to be definitely useful in these cases some time after the injury. The safe policy seemed to be to regard and treat all cases of pain in the back after injury as potential fractures, though if this were made a rule there would be a good deal of unnecessary loss of manpower. When there were obvious injuries to head or other parts after an accident, there was a tendency to forget the chance of serious damage having occurred to the spine.

The Surgical Aspect.

Sir PERCY SARGENT said that the spinal cases he had seen since the war had been due to two common types of cause. The first were those occurring in colliery accidents, the second those due to a fall in the hunting-field. In the first of these classes, a mass of coal fell on the back of the miner while he was in the stooping posture. In the accidents while hunting the mechanism was not always apparent, but hyperflexion of the spine often played the chief part. When the force was extreme, a common dislocation-fracture ensued. It was not his purpose now to speak of gross injuries. A common type (which he depicted on the screen) was one in which one of the bodies was broken off, and usually another piece was pushed back into the spinal canal, causing an angular deformity. In the case illustrated, though the patient lived for some time afterwards, no change had apparently occurred in the architecture of the cancellous tissue of the bodies. In most cases of crush-fracture there must be something more than mere damage to bodies of vertebræ. The cauda equina might be damaged without any obvious bony injury, and without any symptoms occurring at the time; yet the foundations might be laid for traumatic lesions of cord and nerve-roots.

Referring to cases in which no conspicuous damage was done, but in which patients might suffer considerably at a later date, Sir Percy emphasised the need for a special effort to make a firm diagnosis at an early stage. In cases of apparently minor injury to the spine it was advisable to impose a probationary period, not only for rest but also for observation and treatment. A systematic neurological examination should be made and the results recorded; this should be repeated from time to time in case physical signs should come on later. Lateral as well as antero-posterior skiagrams should be taken in every case. In a case shown on the screen the usual antero-posterior skiagram showed nothing abnormal, but a lateral picture revealed a gross lesion with telescoping of the bodies. Attention should be directed to the condition of ligaments and muscles, because of the pains and the possible onset of bony deformity later. A spine which appeared radiographically to be normal immediately after the accident might afterwards show atrophy and collapse of one or more vertebral bodies, as after a crush-fracture. He deprecated the use of the terms "Kümmell's disease" and "post-traumatic spondylitis," as these implied disease or inflammation, neither of which was present. In the condition described by H. Kümmell, of Hamburg, the probable explanation was a mechanical one, excessive pressure being brought to bear on the vertebral bodies, the posterior ligaments and muscles having been so damaged that they did not take their due share of the burden. This condition was likely to be progressive unless treatment was adopted with the aim of supporting the spine from behind; a spinal brace should be used, the muscles being exercised meanwhile—an essential point. Massage seemed to have no other effect on the muscles than improving their nutrition; the effective treatment of muscles consisted in the induction of rhythmical graduated contractions by Morton Smart's or some similar apparatus. The results so obtained were extraordinarily good.

In some cases symptoms of pressure on the cord appeared months or even years after injury of apparent unimportance. To these Sir Victor Horsley applied the name meningitis circumscripta serosa. A coal-miner who had been crushed came to hospital 16 years later. He then had numbness and weakness of the legs, and tingling sensations. Knee- and ankle-jerks were absent. There was an impairment of sphincter control, not objective sensory loss. An angular deformity was found in the lumbar spine, and rarefaction of the bodies of the lumbar vertebræ. Protein content was 2 per cent. Laminectomy was performed, and the cauda equina was found angulated over a prominence. The patient left the hospital well after operation. It was a case of meningitis circumscripta, undoubtedly following injury.

In dealing with victims of aeroplane accidents who showed no sign of spinal injury, it should be remembered that though temporary incapacity in respect of muscles and ligaments was common, more serious latent effects, such as secondary spinal cord symptoms, were comparatively rare. Prolonged incapacity from pain and minor lesions could be prevented by appropriate treatment of damaged muscles, combined with such rest to the parts as might be indicated in any given case. Patients who showed even slight and transient signs of cord injury must be treated with great respect, in view of the possible development of more serious symptoms later.

The psychological aspect of these cases, Sir Percy concluded, was also of importance; how far that affected men in the R.A.F., Group-Captain Wells could perhaps say. In his own experience there was a wide psychological difference between cases occurring in the mine and those taking place in the hunting-field. Victims of the hunt had the one ambition to get back to their ordinary life as quickly as possible, whereas in the miner's case the question of compensation loomed large.

Discussion.

Air Vice-Marshal D. MUNRO said the accidents in the Royal Air Force corresponded more nearly to those in the hunting-field than to those in the mines. No claims for compensation had been made in the Service on account of spinal injuries, nor had there been any cases in which there was even a suspicion that psychology had anything to do with it. He particularly asked what was the pathology of cases in which symptoms of injury were so long delayed, and why the indications remained so long latent.

Did rarefaction gradually take place on account of continued pressure on bone which had been somewhat damaged?

Surg. Vice-Admiral A. GASKELL said that in the Navy both kinds of injury to the spine which Sir Percy Sargent mentioned were met with; men had sacks of coal fall on their back while stooping, and in that branch of the service were many men who were fond of horses and seized every opportunity to hunt. He agreed that the great difficulty when a man had sustained a crash was to know what damage had actually been done to the spinal column. Prof. Hey Groves had recently stressed the great importance of radiograms in different directions in cases of injury. When a softening or rarefaction of bones took place, Nature's lines were disturbed, and so the vertebral column assumed a different angle, leading in course of time to pain and stiffness.

Major J. M. WEDDELL pointed out that sometimes the casual accident was only a minor one, nothing like so great as in an aeroplane crash, and this made the difficulty of diagnosis the greater. Often there was a site of localised hyperæsthesia, and a radiogram would often show a wedge-shaped or deformed vertebra, but not in early stages. In one case only after three careful radiograms was a fissure-fracture revealed.

Dr. BERTRAM SHIRES discussed the radiological aspect of the question. He said that in some of the cases if a skiagram were taken in both aspects immediately after the injury evidence of damage might be revealed, but often a radiogram was not called for until a considerable time afterwards. If this course was followed at a very early stage, few cases would in future be missed.

Dr. MORTON SMART remarked that he did not think anyone was able to say how much the posture of the body was dependent on the bony part of the spine, and how much on the muscular and ligamentous part. He had been much impressed by the importance of the muscle factor in keeping the body erect. When injury to the spine took place, the muscles—the first of line of defence—must give way, and so in fractures of the spine there was injury to muscles, probably also to ligaments; and in many cases keeping in bed brought about almost complete recovery. In most cases, however, soon after getting about again, the patient had a variety of pains in the back, and some pains referred to other parts of the body. This, he considered, was because the muscles, in the course of their repair, became adherent to neighbouring tissues. One result of accident to muscles was that they became quite atonic, and at that stage the efforts of the nervous system to produce contraction were wasted.

Mr. CECIL WAKELEY said that most of these cases in civilian life were due to pressure fractures; fissuring might occur on only one side. An X ray picture taken in the extended posture would often show the fissure. If it was not very definite, another skiagram should be taken from the other side.

Mr. PATERSON ROSS said it was important to ascertain what produced the atrophy; he thought it might be centred in the question of pain. The spine consisted of a series of joints, and a painful joint always resulted in atrophy of surrounding muscles because of the pain, and this atrophy probably led to the wedge-shaped deformity.

Surg.-Commander J. L. PRISTON, dealing with the psychological aspect, suggested that people meeting with accidents in the hunting-field generally had grit, vulgarly called "guts," and were determined to do their best to get back to ordinary life; while in the case of workers in mines and elsewhere the compensation factor was always present to mitigate the eagerness for recovery until the monetary matter had been settled.

The CHAIRMAN suggested that in some of the cases under discussion an important factor was the presence of torn ligaments.

Reply.

Sir PERCY SARGENT said the reason these bones collapsed at a later date was unknown. In some cases examined post mortem, nothing was found but a crumpling of the cancellous tissue of the bone, with hæmorrhage into that tissue. That, however, did not explain the tardy symptoms. He agreed with Dr. Smart that immediately after a muscle had received a severe injury it was actually paralysed.

SECTION OF TROPICAL DISEASES.

A MEETING of this Section was held on Feb. 7th to discuss

MONKEYS AND HUMAN DISEASE.

The chair was taken by Dr. J. B. CHRISTOPHERSON, the President, and the zoological relationships of the primates were first reviewed by Mr. R. I. POCOCK, who contrasted the hands, feet, and habits of the cynomorpha—or monkeys—which were essentially quadripedal on the ground and expertly arboreal, and the anthropomorpha—or apes—which had relatively very long arms and never rested the palm of the hand on the ground. Young apes, he said, could run very well on the legs alone, putting the weight on the heel, like man and unlike the monkeys, which never rested on the heel. Monkeys climbed on the tops of branches while gibbons swung on their hands beneath. The apes seemed to have learned to climb secondarily. The greatest difference of all between man and ape was in the foot; man's foot was unique, and never at any stage of its development showed the divagation of the great toe found in apes and monkeys. Perhaps the appearance of man had driven the apes back to the trees.

Mr. R. LOVELL dealt with

Bacterial Diseases of Monkeys.

He said that no authenticated case of bacterial disease in the natural wild state was on record. Diseases occurring spontaneously in captivity were (*a*) respiratory, (*b*) digestive, and (*c*) tuberculosis and other infections. Epidemics of pneumonia had been recorded, and pneumococci, types 2 and 4, hæmolytic streptococci, and the influenza bacillus had been isolated. Vaccine treatment had been successful on one occasion in stopping the spread of infection, and overcrowding had been adduced as an ætiological factor. An epidemic of colitis amongst baboons had been due to *Bacillus aertrycke* Mutton. Morgan's No. 1 bacillus and Flexner's bacillus had also been isolated from monkeys of various species suffering from gastro-intestinal symptoms. There seemed no doubt that Morgan's bacillus could be pathogenic in monkeys, though the part it played in summer diarrhœa of children was doubtful. An unidentified non-motile Gram-negative bacterium, producing acid in dextrose, maltose, and mannite but not in lactose or sucrose, had been isolated from a number of monkeys showing post-mortem intestinal infection; this organism was allied to the dysentery group. Tuberculosis was a common cause of death among captive monkeys; human and bovine types were equally virulent but death was almost always due to the former. Two Barbary apes had died from infection by a member of the pasteurella group and one chimpanzee from a staphylococcus septicæmia. Experimentally, monkeys had been used for many organisms affecting man—e.g., Malta and yellow fevers, to both of which they were very susceptible. Pneumonia could be caused by insufflation of pneumococci and the influenza bacillus, and meningitis and leprosy had also been transferred to them.

Mr. E. HINDLE'S paper on

Virus Diseases of Monkeys.

was read in his absence by the Secretary. It pointed out what favourable subjects monkeys were for experiments with filterable viruses. Yet monkeys in the wild state did not seem to be susceptible to these organisms, except rabies. Nevertheless, yellow fever epidemics seemed to be preceded by the deaths of large numbers of monkeys. Monkeys so rarely came in contact with man that their importance in

disseminating disease must be very slight. In India, however, large numbers of semi-domesticated macaques lived in close contact and might serve as reservoirs of rabies. The experimental study of yellow fever had depended almost entirely on the discovery that the Asiatic species, particularly *Macacus rhesus*, were susceptible, although local monkeys had complete natural immunity. There seemed no correlation between virulence of a strain in man and in monkeys; indeed, there seemed some reason for thinking a mild strain in man might be most dangerous to monkeys and vice versa. Nevertheless, the virus retained its virulence for man even after repeated passage. The virus could pass through the unbroken skin of the animal. The only certain way of recognising the disease in them was by the post-mortem appearances, which were identical with those in man. The virus did not, however, disappear from the blood and internal organs after a few days of infection as it did in man.

The vaccination discovered through work on monkeys gave a high degree of success in animals and had been used successfully in the Rio de Janeiro outbreak.[1] It seemed likely to prove a satisfactory form of protection.

Poliomyelitis had so far been reproduced in monkeys only, and subdural injections of suspensions of the spinal cord and cortex would carry it on, with increasing virulence until 0·001 c.cm. of a 5 per cent. suspension would kill every animal injected. The human disease was closely simulated, both clinically and post mortem, and experimental work depended on this. Measles had been produced in monkeys by intratracheal insufflations of filtered nasopharyngeal washes from patients, and transmitted to other monkeys and immunity produced thereby. Other virus diseases, such as small-pox, trachoma, and Rocky Mountain fever, found good hosts in monkeys but usually would infect other animals as well. Monkeys were, however, preferable because the course of their disease more closely resembled that in man.

Dr. T. W. CAMERON dealt with

Protozoal and Helminthic Diseases,

embodying a contribution on protozoa from Dr. J. G. THOMSON, who said that comparative study showed that the species in men and monkeys were in many cases identical. Histolytica-like amœbæ had been found in monkeys but were seldom associated with acute dysentery, although they seemed exactly similar to the *Amœba histolytica* of man. Several genera of flagellates were found both in men and monkeys; they were morphologically similar in the two hosts and probably identical. Man might be infected with *Balantidium coli* from pigs, and monkeys could be infected from the pig or man. There was no reason to doubt that monkeys were naturally infected with human trypanosomes, which could readily be subinoculated in them. The presence of malarial parasites in several species had been recorded, but there had only been one positive infection with *Plasmodium vivax* by the injection of human malarial blood. There was no proof that the organisms were identical or that apes could have human malaria.

Turning to his own paper, Dr. Cameron said that the dozen common and important helminths in man belonged either to the flat worms or the round worms. None of the important trematodes of man, except the blood flukes, had been found naturally in monkeys. All the species had been passed to monkeys experimentally and *Schistosoma mansoni* had recently been found naturally among West African green monkeys in St. Kitts. Apart from this organism the natural flukes of monkeys were more closely related to those of bats and ruminants than of man. None of the typical cestodes of man had been reported from primates, but the typical simian genus bertiella had been found occasionally in man. The most important larval cestode accidentally harboured by man was the hydatid, which was also found in monkeys. In man about 75 per cent. of the primary infections were hepatic, but in monkeys 50 per cent. were pulmonary. This distribution was also characteristic of carnivores, rodents, and cattle, and was due to large hepatic vessels, which passed the parasite through the liver. The characteristic human nematodes were ascaris, enterobius, trichocephalus, œsophagostomum, physaloptera, trichinella, hookworms, guineaworms, and filariæ. *Ascaris lumbricoides* was a very rare accidental simian parasite, but monkeys harboured various species of enterobius, though *E. vermicularis* was peculiar to men. *Trichocephalus trichuris*, the most widespread human parasite, was also the most universal monkey-worm, although present in small numbers. Ankylostoma was not found in monkeys, but necator was. Monkey filarias were a distinct genus of which the nearest human relation was *F. perstans*. There were several common monkey œsophagostoma. *Physaloptera caucasica*, a common baboon parasite, had been fairly often found in man. Trichinella could be conveyed to monkeys but did not reach them naturally. Apart from the whipworms, the commonest simian nematodes belonged to the genus subulura, which never occurred in man. The monkey was a definite reservoir host of schistosomes and possibly also of physaloptera and trichocephalus. It was extremely probable that African monkeys harboured *S. mansoni* and *S. hæmatobium*, and that physaloptera had some intermediate host.

Lice and their Bearing on Phylogeny.

Dr. V. B. WIGGLESWORTH said that bird lice had been shown to have a racial distribution. From a study of their parasites it was possible to say that gulls were merely plovers which had changed their form and that flamingoes were just comic ducks masquerading on stilts. The sucking lice peculiar to the mammalia were less abundant. The first group consisted of a single species found only on elephants, both in Africa and Asia. The second group—hæmatopinnidæ—included nearly all the lice of mammals, while the third—pediculidæ—was confined to the primates. Pediculus was found only on man, the chimpanzee and the two gibbons, and also on the spider-monkey of South America. This monkey had been shown to possess characteristics of hair and blood very closely allied to those of the anthropoids and man. Perhaps it was in virtue of these that pediculus had passed from an anthropoid to one special monkey at a period that must have been very remote, as several species had since been differentiated. The crab-louse, long believed to be peculiar to man, had been found by Ewing on the gorilla.

Colonel A. E. HAMERTON described the specimens which he had brought from the Zoological Society's prosectorium to illustrate the morbid histology of monkeys. These included a number of cases of generalised tuberculosis, and a case of mixed mycosis and tuberculosis in a wanderoo macaque. He remarked on the fact that monkeys found riddled with tuberculosis post mortem often showed no symptoms up to the day of their death. Another specimen showed a placenta prævia in a rhesus macaque which had died of hæmorrhage at the end of the first stage of labour. Others showed sarcoma of the lung in an orang-utan with metastases in the liver, spleen, and left kidney; a sarcoma of the right kidney with extensive spread in a capuchin; mitral vegetations in a Pluto cercopitheque—an uncommon condition; intussusception in a macaque, and hæmorrhagic ulceration of the bowel, due to *Bacillus aertrycke*, in a baboon.

Discussion.

Dr. H. H. SCOTT described the *B. aertrycke* outbreak on the monkey hill at the Zoo, due to a carrier and temporary blockage of the water-supply, and a case suggesting that pneumonia in a green cercopitheque had begun as a primary blood disease, settling secondarily in the lung.

Dr. A. BALFOUR recounted his experience in Trinidad, suggesting that monkeys might act as a natural reservoir for yellow fever.

[1] THE LANCET, Jan. 26th, p. 183.

Dr. G. C. LOW did not see how the red howler monkey could have anything to do with yellow fever epidemics, as it never came in contact with human beings. Yellow fever was typically a seaport disease and occurred where there were no monkeys.

Dr. KINGSTON BARTON and Colonel BROUGHTON ALCOCK asked some questions, to which Dr. LOVELL, Dr. SCOTT, and Colonel HAMERTON replied.

SECTION OF UROLOGY.

AT a meeting of this Section on Jan. 24th, with Mr. SWIFT JOLY, the President, in the chair, a paper on

TRAUMATIC RUPTURE OF THE URETHRA

was read by Sir WILLIAM WHEELER. The contribution, was founded, he said, upon six cases encountered during the years 1921–28. The condition was a rare one; only 41 fresh cases of it had been admitted to the wards of the London Hospital in the ten years 1909–19, and only 20 cases had been admitted to the Liverpool Royal Infirmary during the past decade. Rupture was far more common in the bulbous portion of the urethra, well in front of the triangular ligament, and it was known that if the membranous segment was severed it was exceptional for a tight stricture to develop in the process of healing. It had been stated that in France the accident usually occurred in young adult men, but the speaker did not think this was so in all countries; in his own six cases the average age was 42, while in Mr. Frank Kidd's 57 cases it was 33 years. Sometimes extravasation from the injury was seen in the anal region, the ischio-rectal fossæ, and the thighs. Anatomical limits were more commonly overrun in non-traumatic rupture occurring behind old infected strictures. In the first case of Sir William's series the urethra was torn off near the neck of the bladder, above the triangular ligament, and before operation the outstanding feature was a spread of urine and blood into the perinæum, scrotum, penis, and the front of the abdomen, in a way characteristic of rupture in the region of the bulb.

Diagnosis.

When the urethra ruptured well in front of the triangular ligament a perineal hæmatoma nearly always followed; blood trickled from the meatus almost immediately, and though the patient had an intense desire to pass water he could not do so. The local pain was severe. Extravasation of urine was prevented by reflex spasm of the compressor urethræ muscle until hours had elapsed. But for this saving spasm the mortality from early extravasation of urine and infection would be much higher. Often the amount of bleeding from the meatus after the accident was in inverse proportion to the urethral damage; after only partial division the hæmorrhage was likely to be more profuse and continuous than it was after complete rupture, for in the latter event hæmostasis was favoured by retraction of the part. Large hæmatomas might be found even when there had been no rupture if the corpus spongiosum was seriously damaged but the mucous membrane did not yield. Also severe traumatic stricture might follow injury without rupture. If the pelvis was broken the rupture was more likely to take place above the triangular ligament, in the region of the apex of the prostate. But it might be between the bladder and the bulb. The surgeon should always have in mind the possibility of a ruptured bladder above or below the reflection of the peritoneum. Because a ruptured bladder was empty it could never be palpated. A catheter could be passed freely through the urethra, but only small quantities of blood-stained urine came away. The extent of injury would be found at operation to be greater than had been anticipated judging by the signs and symptoms immediately after the accident; and this fact was a strong reason for operating in every case. A black patch on the glans penis indicated that probably the whole of the corpus spongiosum was infiltrated with urine. When there was extravasation in traumatic cases the absence of pre-existing infection (present in old-standing stricture cases) gave a relatively better prognosis, especially as the victims of the accident were usually in good health when it occurred. If operation was delayed, and the patient did not die, the parts became riddled with sinuses and urinary fistulæ—a very grave condition. Associated pelvic fracture should be treated.

Treatment and Results.

Sir William Wheeler laid stress on the importance of a uniform method of early treatment in these cases. One of his six patients died ten days after operation from pneumonia. This patient, whose age was 27, was operated on at an early stage, and there was no fractured pelvis or other complication. His rupture was in the region of the bulb. The other five patients in the series reported themselves cured after periods ranging from seven years to five months. Operation must not be undertaken hurriedly; good results largely depended on complete hæmostasis and asepsis. A hypodermic injection of morphia was given, and the distended bladder was, if necessary, emptied by suprapubic puncture before removing the patient to hospital. In describing his operative technique Sir William pointed out that when the rupture of the urethra was intrapelvic, the pubo-prostatic ligaments were torn and the bladder became displaced backwards. In such cases the retained catheter was necessary. The literature of the subject, he said, disclosed a general consensus in favour of immediate suprapubic cystotomy in fresh cases of ruptured urethra. The proximal end of the urethra —notoriously difficult to find—could be hit upon by retrograde catheterisation. By employing a retention catheter for about a fortnight and avoiding perineal drainage, four advantages were claimed: the patient was much more comfortable and nursing was simplified; there was a minimum of scar formation in the perineum; subsequent instrumentation was simplified; and convalescence was hastened.

Discussion.

Mr. RALPH THOMPSON said that in a long series of cases at Guy's Hospital the deaths following venereal stricture were 48, and following traumatic stricture two. In about one-third of the cases of fractured pelvis the urethra could be expected to be damaged. In most of the cases of ruptured urethra which came to the genito-urinary department at Guy's nothing seemed to have been done for the patients; no suprapubic cystotomy was carried out, nor any effort made to unite the ends of the ruptured urethra. The profession at large should be told of the importance of operating to deal with the urethra as soon after the accident as possible. The urethra might be only partially ruptured.

Mr. FRANK KIDD hailed with satisfaction this insistence by a distinguished general surgeon on the necessity for paying attention to this subject, and reminded the meeting of his analysis, in 1921, of a series of 57 cases at the London Hospital, showing how seldom the injury occurred. That 24 out of 25 of his patients remained alive showed that the accident was not so serious from the standpoint of life as many supposed. As a result of examining many cases he had arrived at the conclusion that the real cause of stricture formation was a pulping of the tissues. He did not think the use of a catheter made any difference to the occurrence of stricture. It was quite simple in these cases to make a small incision into the bladder, under an anæsthetic, straight away; then retrograde catheterisation could be carried out. Bad stricture cases which were causing trouble did very well after internal urethrotomy.

Mr. FOWLER WARD said he thought the end-results largely depended on the age and weight of the person and the stage the condition had reached by the time the surgeon was called in. In children he usually found that the injury was not severe, and under suitable treatment healing was prompt. When a

heavy man fell astride anything the injury to the urethra was generally very severe, and the case was not seen by the urological surgeon until the third or fourth day afterwards, the statement being that the patient had not passed water for a day or two. The tissues might have sloughed, and if so there was no chance of immobilising the ends of the ureter and bringing them together. What he had aimed at in several cases was passing a catheter through the penile urethra, and, if this was not possible, doing suprapubic cystotomy and retrograde catheterisation. He always preferred the use of silver catheters to rubber ones, as the latter occasionally became very objectionable.

Mr. WINSBURY WHITE described a case of fracture of the pelvis involving partial rupture of the urethra. In a run-over accident seven years ago the boy had his symphysis pubis separated about an inch, and there was considerable extravasation of blood in the perineum and external genitals, as well as in the upper part of the right thigh. No sign now remained of extravasation of urine, and he could pass urine freely.

Mr. CYRIL NITCH said that in two of three cases he had seen in children there was severe injury to the urethra and also associated fracture of the pelvis and crushing of the membranous urethra. Much scar tissue formed in consequence. He agreed with Sir William Wheeler that the best—indeed the only—line of treatment of these cases was to drain the bladder and suture the urethra.

Mr. HUGH LETT said that years ago Mr. Reginald Harrison pointed out that, where there was a leakage of urine, dense fibrous tissue was always met with. There was every reason for opening up the bladder in the first place in these cases and doing suprapubic drainage. He also dwelt on the advantage of retrograde catheterisation.

Mr. G. E. NELIGAN also emphasised the importance of suprapubic drainage of the bladder in these cases, followed by the tying-in of a catheter. In the type in which a person who had been run over sustained a fractured pelvis, and an injury between the prostatic and membranous urethra, there was often difficulty in getting the ends of the urethra together. He described his own modus operandi in these cases.

THE PRESIDENT said that four of the seven patients with this accident whom he clearly remembered were under the age of 20. Rupture of the urethra could follow a trifling accident. When the posterior urethra had been ruptured it was sometimes very difficult to decide what should be done, especially when the pelvis was fractured at the same time. But suprapubic cystotomy must be the first step.

Sir WILLIAM WHEELER, in reply, emphasised again the necessity of not hurrying the undertaking of the operation in these cases. If the bladder was dilated it was best to aspirate it. He did not use crutches in doing these operations; he found it better to give one leg of the patient each to an assistant, so that tension could be transferred at a moment's notice.

DONATIONS AND BEQUESTS.—The late Mr. Charles G. Arbuthnot, of Eaton-square and Knowle, Cranleigh, Surrey, left, among other bequests, £5000 to the Grosvenor Hospital for Women, and £1000 each to St. Andrew's Convalescent Hospital, Clewer, St. Andrew's Convalescent Hospital, Folkestone, and the Cancer Hospital, Fulham-road.—Mr. Alfred Charles Bunting, of Woodlawn, Uttoxeter, Staffs, left £500 to the Uttoxeter Nursing Association, £100 each to the North Staffordshire Infirmary and the Derbyshire Royal Infirmary, and, after other bequests, the residue of his property to his wife for life with remainder as to one-fourth equally between the Uttoxeter Nursing Association, the North Staffordshire Infirmary, and the Derbyshire Royal Infirmary.—Mr. W. Weddell, of Hampstead, left £1000 each to the London Hospital and Dr. Barnardo's Homes, and £500 each to the Hampstead General and North-West London Hospital, St. Columba's Hospital, Swiss Cottage, the Royal Hospital and Home for Incurables, Putney, the Poplar Hospital for Accidents, St. Bartholomew's Hospital, and several other institutions.

MEDICAL SOCIETY OF LONDON.

EARACHE.

AT a meeting of this Society held on Feb. 11th Dr. J. WALTER CARR, the President, being in the chair, a discussion on this subject was opened by Dr. H. MORELAND MCCREA from the

Standpoint of the General Practitioner.

Earache, he said, might be a localised pain, a referred pain, or a transferred pain, and it was important to remember, when confronted with the complaint that there was an intimate nerve connexion between the ear, the teeth, the tonsils, the larynx, the cervical plexus, and even the heart, the main lines of this nerve Clapham Junction being the vagus, the fifth cranial, and the glosso-pharyngeal. He had seen a striking example of transferred pain in a patient whose attacks of angina pectoris always began with violent earache. The first problem to be solved by the doctor seeing a case of earache was to ascertain whether the pain was due to a lesion of the auditory apparatus or not. A neglected otitis media might be one of the most serious conditions which the general practitioner was called upon to treat; there were 1047 deaths from this in England and Wales last year. Pain in and discharge from the ear were frequently caused by furunculosis in the skin lining the external auditory meatus. *Staphylococcus aureus* was usually present in this. Sometimes earache with deafness and some swelling was due to the presence of aspergillus nigra. Minor causes of earache might be the presence of cerumen in the meatus, increase of atmospheric pressure due to blocking of the tubes, or a catarrhal cold. After every injury such as a fall on the head the auditory apparatus should be carefully examined. If no local cause for the earache could be found, regions from which pain could be transferred or referred should receive attention; especially should teeth and tonsils be inspected in a good light. Earache due to acute tonsillitis might persist even after the tonsils had been enucleated. Intense pain in the ear sometimes ensued from a buried wisdom tooth. Ulceration or erosion of the tongue could cause earache, and when this was the case the symptom was aggravated by the mastication of food; it could also accompany early cancer or tubercle of the larynx. Theoretically, sinus trouble ought to be a cause of earache, but he had not met with such a case.

Mr. HERBERT TILLEY dealt with the subject from the

Standpoint of the Aural Surgeon.

The gravity of the lesion, he said, might bear little proportion to the severity of the pain. A furuncle of the meatus, though of little danger to life, might render life intolerable for days because of the acute pain, while an earache which amounted to no more than discomfort might be the only subjective symptom of retained sepsis close to the temporal meninges.

Of *intrinsic causes*, a foreign body pushed into the meatus of a child might have caused laceration and pain. If the body was a small bean or grain of corn which swelled under warmth and moisture, intense inflammation might spread to the tympanic membrane. If not impacted the body might be removable by gentle syringing. Otherwise under a general anæsthetic a curved probe or hook should be used, under a good light, for its removal. In adults there might be a foul pledget of wool which had been forgotten. It was not unusual for a collection of cerumen to cause earache when it pressed against the tympanic membrane; patients might even complain of vertigo. One must not mistake for wax, however, the brown coloured adherent accumulation in the depth of the meatus known as a cholesteatoma. This was frequently associated with chronic suppuration in the tympanum or mastoid antrum and cells. When furunculosis occurred in the ear, owing to the resistance of the parts, the pain was continuous and intolerable

and any movement of the mandible accentuated the pain. Unless the drum membrane was involved, however, hearing was not affected. In the differentiation of mastoiditis from furuncle the following points should be remembered: The hearing would probably be normal in the case of furuncle, but not likely to be so in mastoiditis. If meatal inflammation alone was present any movement of jaw or auricle would greatly accentuate the pain, but that of mastoiditis would be scarcely increased by it. Direct pressure on the œdematous area would not greatly accentuate the pain of furuncle, but it would definitely do so when inflammation was present in mastoid antrum or cells. If the case was difficult and one could not exclude mastoid involvement, the region should be explored and the furuncle freely opened. The risk of this would be much less than that of leaving a possibly infected mastoid without free external drainage. In treatment hot fomentations over the auricle and the insertion of a strip of gauze soaked in warm lotio plumbi et opio might relieve the early inflammation, and the internal administration of aspirin, pyramidon, or similar remedies greatly lessened the earache. If, as was usual, the pain continued, a brief general anæsthetic should be given, the meatus sterilised, and a free, deep incision made into the abscess. Relief followed immediately. A staphylococcus vaccine often prevented a recurrence of the furunculosis.

Acute inflammation of the middle-ear cleft provided the physician with most of his cases of severe earache, and it was practically always accompanied by symptoms of a general toxæmia. Infection occurred by way of the nasopharyngeal orifice of the Eustachian tube. Middle-ear infection was common between birth and puberty, because then the nasopharynx had its full complement of lymphoid tissue, tissue which constituted an excellent medium for the growth of micro-organisms. He impressed on students that when they were called to an infant who was restless, fretting, or screaming, the abdomen or the ear should be regarded as the most likely seat of the trouble. If the abdomen could be excluded each tympanic membrane should be examined, and with present hospital facilities it should be easy to detect the difference between a normal opalescent tympanic membrane and one which was red and congested. The infant's hand would be tossed towards the affected ear, and the child would tend to lie with the inflamed ear uppermost. Some pyrexia would always be present, and some gave to the symptoms the name "meningism." There might be no discharge until these symptoms had lasted 24 to 48 hours or longer, and it was not wise to wait for discharge before attempting a diagnosis. If, however, discharge had commenced when the patient was first seen the meatus should be cleaned and an effort made to ascertain the site and size of the perforation in the tympanic membrane and the condition of the meatal walls. A magnifying Siegel's speculum would facilitate this. With regard to treatment, if acute inflammation of the intact tympanum was present the tympanic membrane could be incised under general anæsthesia in a child, while in an adult anæsthesia could be produced by applying a solution containing cocaine, carbolic acid, and adrenalin chloride. It was his firm conviction, said Mr. Tilley, that when the tympanic membrane was acutely inflamed and uniformly congested, paracentesis should be performed; clean and free incision through the posterior half of the drumhead gave immediate drainage, and so saved the delicate middle ear from possibly irreparable damage, and might also hinder the spread of infection to the mastoid antrum. If, on the contrary, one waited for spontaneous rupture of the membrane to take place suffering would be prolonged and danger would be increased. Pain on pressure over the mastoid was practically always present during the first few days of an acute inflammation of the middle-ear cleft, but it did not always call for immediate surgical exploration.

Milder and more fugitive forms of earache in children should be regarded as a warning of infection of Eustachian tube and middle ear, and adenoids would be frequently found in these cases. Inflammations of the middle ear met with in the course of influenza were often rapid in onset and severe in degree, and there might be found hæmorrhagic blebs on the deep meatal walls. Here early incision of the membrane was even more essential than in the more common types of inflammation. In chronic suppurative otorrhœa earache should be regarded as a symptom of significance, as it meant that septic products were being retained under tension in the middle ear or its adnexa. It was necessary to make free exposure and drainage of a septic focus. Earache, too, might be complained of by patients having chronic non-suppurative inflammation of the middle ear cleft which had produced cicatricial changes in the tympanum, or a sclerosis of the mastoid bone. The pain in these cases was usually dull and boring.

Of *extrinsic* (or referred) *earache*, one seat of trouble was the sphenoidal sinus and its neighbourhood. A lady suffered from bouts of pain every four or five days, and the sudden cessation of symptoms always followed a feeling of something having burst in the head, when she had an unpleasant smell in her nose. Drainage of the sphenoidal sinus entirely cured her. An essential condition for the transference of pain from a visceral region to the body surface was that the ganglion cells of the afferent fibres of both these regions should be located in proximity in the same sensory ganglion, while centripetal processes from both sets of cells passed together into the bulb.

Discussion.

Sir JAMES DUNDAS-GRANT spoke of methods of examining the tonsil to avoid missing disease. If the tonsil were anæsthetised with guaiacol and olive oil and the ear pain then ceased, one knew the tonsil was the cause of the earache. Many patients sent for urgent mastoid operation were found to have furuncle; it was a real trap. Often an enlarged submaxillary gland caused earache; a concretion in Wharton's duct had the same effect. In one case of severe earache he found an epitheliomatous ulcer at the root of the tongue.

Dr. T. H. JUST emphasised the great value of the electric auriscope in practice, though it was not popular with some older practitioners. Some held that to operate on the mastoid in a doubtful case and find the condition was furunculosis was anathema, but it was playing for safety, and was no more to be criticised than removing the appendix needlessly. Herpes zoster oticus was, he considered, easy to diagnose in the early stages, but not always so if neglected when facial paralysis might be present and nerve deafness severe. Diagnosis rested on hearing and labyrinthine tests.

Mr. HAMBLIN THOMAS said that if streptococci got into a small abrasion behind the ear in a child the condition might be mistaken for acute otitis media. Sometimes an accumulation of wax had, by pressure, eroded the skin, so that even after removing the wax the pain might persist, calling for local treatment. Carbolic acid and glycerine instillations into the ear might relieve pain for the time, but they might remove the superficial layers of epithelium. People with high blood pressure and arterio-sclerosis might have very definite earache in consequence.

Dr. E. C. STEELER said he had always found it safer and better at once to open an inflamed and protuberant drum than to allow it to rupture of its own accord.

Reply.

Mr. TILLEY said that if there was present an early stage of malignant disease of the middle ear, the light touching of the small granulations with a probe caused instant bleeding. Concretions due to other causes, however, bled to a less degree, and only after there had been considerable manipulation of them. He had seen only two cases in 30 years of pain in the ear due to sphenoidal sinus suppuration.

LIVERPOOL MEDICAL INSTITUTION.

AT a meeting on Jan. 10th, a discussion on

THE INJECTION TREATMENT OF VARICOSE VEINS

was opened by Dr. STUART MCAUSLAND. He said that from the histological aspect the process of vein obliteration by injection was essentially a chemically produced irritation of the endothelium which caused the formation of a firm clot; the fact that the clot was firm, together with the phenomenon, radiographically confirmed, that the circulation in varicose veins was downward, and with the innumerable clinical successes which had been obtained without accident, negatived all danger of embolus. Having discussed indications and contra-indications, Dr. McAusland described the technique used by him, and gave the results of his own cases, together with after-effects. He concluded that salicylate of soda and quinine with urethane were the substances of choice; that patients should rest the limb for 20 minutes after injection; and that the advantages of the method were exactly those of hæmorrhoid injections. The treatment was essentially ambulatory, nearly painless, and much cheaper than operation; it was more successful than excision, smaller radicles being reached; recurrence was less likely. The treatment, moreover, avoided the risks associated with operation, such as general anæsthesia and post-operative embolus.

Mr. H. F. WOOLFENDEN emphasised the apparent safety of injection treatment, in so far as the risk of pulmonary embolus was concerned. The thrombus formed was firm in character, the thrombosis being secondary to the chemical endophlebitis and resembling the tough fibrinous thrombus met with in aneurysm. The convenience of the treatment from the patient's point of view was undoubted and the cure seemed to be as likely to be permanent as that resulting from operation. Certain disadvantages of the method had to be considered. The first was pain, which was sometimes met with at the time of injection when sodium salicylate was used, but it was generally for some days afterwards that patients complained at times of pain and tenderness on the leg. This might possibly be due to part of the injection being outside the vein or to a leak back at the puncture hole in the vein, but it also occurred when the injection was undoubtedly in the vein and was then due to an excessive reaction, causing periphlebitis. This excessive reaction had four possible causes: (1) stronger solution; (2) stagnation in the vein; (3) thinness of the vein wall; and (4) idiosyncrasy of the vein. There was also the possibility of errors in technique causing slough formation by injection outside the vein. This should not occur, but unfortunately it did so occasionally. As to the relative advantages of quinine, sodium salicylate, and sodium chloride, quinine and urethane were most suitable for the peripheral injection of small and moderate-sized veins, but sodium salicylate and sodium chloride given by Colt's technique were excellent for large varices involving the long saphenous system on account of the speed with which cure could be obtained. It was important to bandage the leg after injection, so that the formation of large bulky clots could be avoided.

Mr. J. B. OLDHAM said that on the question of safety of injection treatment, the sceptics advanced the objections: (1) the risk of general toxic symptoms; (2) local complications; and (3) pulmonary embolism. Severe symptoms attributable to excessive doses of quinine had been known to occur, but the speaker found that all these could be obviated by (1) giving a very small initial dose (½–1 c.cm.) to test the patient's susceptibility, (2) giving not more than 7–8 c.cm. at one sitting, (3) keeping the limb at rest for half an hour after injection. Sicard had supplied experimental proof that solutions injected in varices remained in situ, if the limb was kept at rest, but quickly entered the general circulation when active movement was allowed, and Mr. Oldham had himself made a similar observation following injection of methylene-blue. Local necrosis was almost always the result of the solution entering the subcutaneous tissues—an error in technique—but occasionally, as Mr. Woolfenden had mentioned, necrosis followed what had apparently been a perfect injection. Embolism was a theoretical possibility, but the practical clinical evidence of many hundreds of thousands of injections without a fatality—no case of fatal embolism following a sodium salicylate or quinine injection had been observed—was more than sufficient to outweigh this theoretical danger. In spite of the unlikelihood of the occurrence of embolism, the following precautions were advocated: (1) the patient should not move for half an hour after injection; (2) technique should be scrupulously aseptic; (3) if possible, excessive muscular activity should be avoided for three to four weeks after completion of treatment. The advantages over the operative methods were enumerated, and it was pointed out that one fatal case of embolism happened in every 700 or 800 major operations. Mr. Oldham thought that a tourniquet was helpful, and that injections should be given with the patient lying down; quite independently he had come to the same conclusion as had Mr. Woolfenden as to the great advantages of supporting the veins with a bandage for a few days after injection. In cases with a positive Trendelenburg sign, good results could often be obtained by a single injection made as proximally as possible, the consequent fibrosis being equivalent to the old Trendelenburg operation and protecting the distal veins from the passive downward reflux of blood.

MANCHESTER MEDICAL SOCIETY.

AT recent meetings of this Society, with Dr. R. W. MARSDEN, the President, in the chair, Dr. C. S. D. DON read a paper on the

Treatment of Exophthalmic Goitre.

An attempt was made to compare the three lines of treating this condition at present adopted—namely, (1) iodine therapy, (2) X ray therapy, and (3) operative procedures. The improvement or otherwise was gauged by a comparison of the basal metabolic rate, the weight, and the pulse before and after treatment. It was found that iodine produced a temporary fall in the basal metabolic rate and pulse and an increase in weight. The fall in the basal metabolic rate and pulse lasted for about a month, in some cases longer, while the increase in weight in nearly all cases continued for about five months. Iodine by itself cannot cure exophthalmic goitre, and if given and then stopped a second course has less effect. A number of cases who had X ray therapy for periods over a year were examined repeatedly at intervals of three months, the basal metabolic rate being estimated on each occasion; out of a total of 30 cases improvement or cure was noted in 54 per cent. In 27 per cent. of cases the basal metabolic rate and pulse-rate were found to have returned to within normal limits—regarded as the criterion of cure. Operative procedures were then considered, attention being drawn to the value of iodine in preparing for operation. Of 12 cases operated on at least eight months before the date of examination a fall in the basal metabolic rate and pulse to normal was found accompanied by an increase in weight in 75 per cent. Of 18 cases examined before iodine was given, after iodine was given, and two weeks after operation, cure was noted in 85 per cent. As a result of his observations Dr. Don advocated X ray therapy without iodine administration for six months, and at the end of this period, if the basal metabolic rate and pulse had not come down considerably, the patient should be given iodine and then operated on. Cases with basal metabolism of plus 35 per cent. or over should be treated by a preliminary ligation; those with a basal metabolic rate below plus 35 per cent. should have four-fifths of the goitre removed by thyroidectomy.

Reviews and Notices of Books.

Diseases of Children.

First edited by Sir Archibald Garrod, F. E. Batten, and Hugh Thursfield. Second edition edited by Hugh Thursfield, D.M., F.R.C.P., and Donald Paterson, M.B., M.R.C.P. London: Edward Arnold and Co. 1929. Pp. 1106. 45*s*.

The appearance of a second edition of this book after an interval of 15 years will give genuine satisfaction and pleasure to medical readers throughout the country. The editors have earned the gratitude of the profession by perpetuating a work which has long remained the most comprehensive and representative product of British pædiatrics. The untimely death in 1918 of Dr. Batten removed a great authority on the neurology of childhood; however, continuity of the book has been well preserved by Dr. Thursfield, in collaboration with Dr. Donald Paterson, and valuable contributions from the pen of the original senior editor are included. The revision of so well-known a work, the individuality of which has as much to do with its form as with its content, must of necessity present problems of great difficulty. The editors have made it their object to preserve the original arrangement wherever possible. In the greater part of the book sequence of the subject matter of the chapters is similar to that of the first edition, though occasionally the account of a disease has been transferred to a more appropriate section as a result of an altered view of its ætiology.

The "prolegomena" appears in shortened form; Dr. Gossage's article on heredity remains, and that on immunity has been rewritten by Dr. D. McLean and Mr. Eric Lloyd. A number of articles have been revised by their original authors, for example, those by Prof. F. Langmead on the new-born, Dr. H. Morley Fletcher on liver and peritoneum, Dr. Thursfield on the hæmopoietic system, and Dr. J. W. Carr on tuberculosis. In some chapters additions and alterations have been made by a new author, the original features of the article being preserved; among these are the sections on respiratory disease, metabolic disorders, and organic disease of the nervous system. An equally high standard has been attained in those chapters which are wholly or mainly new. That on nutritional disease has been rewritten by Dr. L. G. Parsons. The disorders which he describes—infantile atrophy and rickets—are among those which show most evidence of the advance of knowledge during recent years, and his contribution provides a lucid statement of modern views on their causation and treatment. Additions have also been made to the section on alimentary diseases; more space is devoted to surgical conditions, and a notable feature is Dr. Reginald Miller's account of cœliac disease. In the chapter on cardiac disease Dr. G. A. Sutherland has achieved a triumph of condensation, and has given in a remarkably small space a really clear description of its manifestations, considered in relation to their effects on the genetic, contractile, and valvular systems. The articles by Dr. E. A. Cockayne on the ductless glands and Dr. J. C. Spence on the genito-urinary system both give readable and up-to-date accounts of subjects upon which current opinion has recently undergone much change.

The chapters on the nervous system show the difficulties of the revision of a work of this kind; a division into functional and organic diseases is not so easily achieved as in 1913. The spasmophilic neuroses have been removed from the section on functional diseases and are considered under rickets, but convulsions and epilepsy remain, the latter being dealt with by Dr. W. G. Wyllie. The conditions commonly classed as neurotic are described by Dr. H. C. Cameron, who has incorporated some passages known to readers of his works on children's disease. Great praise must be accorded to Dr. Wyllie not only for what he has contributed himself—such as his excellent article on encephalitis—but for the skill with which he has preserved the individuality of Dr. Batten's chapter on organic disease. The same high standard is reached by Dr. F. J. Poynton on rheumatism, Dr. B. Schlesinger on infectious diseases, and other contributors, all of whom are authorities on their subjects. A welcome innovation is provided by Mr. P. G. Doyne's concise summary of ophthalmic disease in childhood.

This book has already won its place in the foreground of pædiatric literature, and the editors have done all that can be done to ensure that the second edition will maintain this position.

Diagnosis in Hepatic Disease.

Praktische Differentialdiagnostik. Für Aerzte und Studierende. Herausgegeben von Prof. Georg Honigmann. Band I. Innere Medizin. Teil 5. *Erkrankungen der Leber und Galle.* By Dr. Karl Glässner, Professor at the University of Vienna. 1929. Dresden and Leipzig: Theodor Steinkopff. Pp. 392. M.4.50.

This comprehensive new work written by clinicians working in Giessen, Vienna, Düsseldorf, Breslau, Munich, Cologne, and several other centres in south Germany and Austria is now appearing in handy instalments. There are seven volumes devoted to special branches of medicine or surgery. Each volume is divided into several parts and each part is entrusted to one author. The parts are printed separately and they vary in price and size, the average being 6 marks and 100 pages respectively. Part 5 of Volume 1, on liver and gall-bladder diseases, is written by Dr. Glässner of the University of Vienna. It is a very practical and complete little brochure, well arranged and concise. The author stresses the importance and unfailing value of a thorough physical examination of the patient. Clear accounts are given of radiological methods of investigation and analyses of bile obtained by a duodenal tube. Cholecystography is not, however, given sufficient recognition. The chemical tests of liver function are well explained, but they take a place in the author's technique second to the bed-side clinical investigation by the classical methods. There are no charts or diagrams, and the appearance of spaced lettering on almost every page is a little distracting to the English reader. Some useful tables of differential diagnosis between maladies like "Wilsonsche Krankheit" and "Malarialeber" are included. A large bibliography has the advantage of being quite up to date. It indicates that the author has drawn freely from the writings of Hijmans v. d. Bergh, Aschoff, Chauffard, Wilkie, Eppinger, and Franklin.

The Problem of Fermentation.

By M. Schoen, Institut Pasteur. Translated from the French by H. Lloyd Hind, B.Sc., F.I.C. London: Chapman and Hall, Ltd. 1928. Pp. 211. 21*s*.

The study of fermentation has played a great part in the history both of medicine and of chemistry. Lavoisier, Gay-Lussac and Liebig, Dumas, Claude Bernard and Pasteur, all these great men and many others have in the past been closely connected with the development of this "most striking and extraordinary reaction," as Lavoisier described it. Nor has its significance diminished as knowledge grew. Lavoisier deduced in part from the study of fermentation his statement of the law of the conservation of matter; Pasteur was able to recognise the function of yeast in alcoholic fermentation, and thus laid the foundations of modern microbiology; the work of Liebig, Berthelot, and Büchner led to the modern theory of enzyme action; and in our own day the researches of A. V. Hill and O. Meyerhof have thrown light on the action of living muscle, a subject which has been a source of mystery to investigators since lactic acid was first shown to be a product of muscular action. Hill, by his brilliant micro-calorimetric researches, has been able to explain the phases of muscular contraction, whilst the work of Meyerhof has placed the whole subject on a quantita-

tive and mathematical basis. During the past few years O. Warburg's studies in Berlin have also aroused much interest. He has been able to demonstrate the quantitative difference between normal and malignant tissues as regards glucose metabolism, and here, also, there are certain resemblances in metabolism to that of yeast in the fermentation of carbohydrate.

Prof. A. Fernbach, in his introduction, points out that this book is not so much a complete dictionary of facts as a summary of the ideas to which they give rise. Alcoholic fermentation forms its principal theme, but sufficient space is given to various other aspects of fermentation to stimulate the reader's curiosity. The opening chapters contrast the theories of Pasteur with the enzyme theory of fermentation; bacterial fermentation, and the relation of fermentation to respiration are also considered. The theories in which various intermediate substances in the alcoholic fermentation of sugars are postulated are discussed in some detail, and the function of phosphates in alcoholic fermentation and Harden's theory are dealt with in the succeeding chapters. The final sections are concerned with the influence of the reaction of the medium, and the processes of oxidation and reduction on these reactions. The inclusion of a chapter on hydrogen-ion concentration and its determination appears to be unnecessary, since numerous general text-books of physiology and biochemistry deal adequately with the elementary aspects of this question.

The subject of fermentation is a vast one, to which this monograph may be considered a useful introduction. It contains an extremely useful, up-to-date and well selected bibliography.

ROENTGEN DIAGNOSIS OF ECHINOCOCCUS TUMOURS.

By GUNNLANGER CLAESSEN. Stockholm: Acta Radiologica. 1928. Supp. 6. With 86 illustrations. Pp. 155.

THIS small volume from Iceland is founded on a most careful clinical and radiological research, financed by the University of Iceland, into 44 cases which came under the author's observation. Thirty-seven of these were primary in the liver, and he draws the conclusion that, in Iceland at any rate, primary pulmonary echinococcus cysts are exceedingly rare. In England we so seldom see patients suffering from this infection that there is little literature apart from scattered references and sporadic records of isolated cases. Consequently, the radiographic appearances and diagnostic points have not been very clearly defined. The only other considerable record of radiological investigation of echinococcus that we have seen comes from New Zealand where hydatid disease appears to be comparatively common. C. C. Anderson's work was published in the *New Zealand Medical Journal* of August, 1926. (See also *British Journal of Radiology*, November, 1928.)

Dr. Claessen is to be congratulated on an excellent and complete thesis.

CHARLES DARWIN.

The Man and His Warfare. By HENSHAW WARD. London: John Murray. 1928. Pp. 472. 21*s*.

THE author of this book is interested in the man Darwin, as who could fail to be, but he is even more interested in his warfare. To him Darwin is the protagonist of true science, who with his weapon of observation defeats the forces of theory and speculation. For 2000 years mankind had toyed with the theory of evolution, but it remained a theory till Darwin came. It is his peculiar merit that in an age of speculation he refused to be satisfied with the views of biologists, the beliefs of theologians, and the conclusions of philosophers. Darwin had no use for the doctrine of the armchair theorist, prevalent even to-day, that by intense thought the superior mind can create knowledge. He demanded facts, and he could never have enough of them. For a man with his genius for accurate observation and enormous industry the five years spent on the *Beagle* were invaluable. But they were merely the prelude to 23 strenuous years during which in spite of persistent ill-health the "Origin of Species" was gradually evolved. How the Darwinian doctrine was developed and how it was received is graphically described by Mr. Henshaw Ward. We are so prone to take things for granted that it is difficult to realise the storm of controversy which Darwinism excited only half a century ago. But the author has successfully recaptured the atmosphere for us—and he has done even more, for we finished his book and then turned once again to the "Origin of Species."

THE TEETH AND THE MOUTH.

By LEROY HARTMAN, D.D.S. London: D. Appleton and Co. Pp. 93. 5*s*.

THE great interest taken by the lay public in the teeth has led to the production of a number of books which, written in non-technical language, attempt to convey the principles of dental hygiene with varying success. This work is an example of what in America is called the quiz book, and consists of questions and answers. The method may be well suited to convey potted knowledge to the student preparing for an examination; it is not necessarily the best way to educate the public in technical matters, though it has the advantage, possibly a doubtful one, that it can be read in snippets and does not make any serious call on the attention of the reader. But within limits the book does manage to convey a large amount of useful information of a practical kind on the hygiene of the teeth. The information generally is on sound lines, though in a book written primarily for an American public the various dietaries advised include certain articles of food unknown here. There are a few pieces of advice which seem to us rather unwise. For example, the question is asked as to what should be the treatment if a child should dislocate a permanent incisor from the mouth. The answer is that the tooth should be picked up, washed in salt water and replaced in the socket. Apart from the risk of tetanus, not entirely negligible, such a tooth should only be replaced by the dentist after the pulp has been removed, the root canal filled, and some more adequate method of disinfection carried out than that recommended.

WHAT IS LIFE?

By AUGUSTA GASKELL. London: Baillière, Tindall and Cox. 1928. Pp. 324. 16*s*.

Mrs. Gaskell proposes that life is a quantity, made up of the same ultimate constituents (electrons) as matter but differing from matter in the manner in which these ultimate units are combined. This quantity varies and forms a series, comprising a very large number of different forms and variations of forms. The quantity life is regarded as identical with soul and mind. An organism consists, therefore, of two systems—material atomic, which is its substance, and immaterial intra-atomic, which is its life. Death is the dissociation of these two systems. As Prof. K. T. Compton and Prof. Raymond Pearl respectively point out in introductions which they have written to the book, Mrs. Gaskell's theory is credible in the sense that it is nowhere grossly discrepant with what are believed to be the assured data of physics and biology. But there is no direct evidence in its favour and its truth fails entirely if it is tested by the modern criterion of fruitfulness; for all that the authoress asserts to the contrary, we judge that it explains nothing and suggests nothing. Nor do we understand how it can be tested by any critical experiments, though Prof. Pearl seems to accept Mrs. Gaskell's claim that this can be done. We cannot advise anyone to spend much time over the book; those who are interested in such problems would do better to read Prof. A. S. Eddington's Gifford Lectures from which Mrs. Gaskell would learn that electrons are not quite the ultimate verities which she seems to think them to be.

THE LANCET.

LONDON: SATURDAY, FEBRUARY 16, 1929

CEREBRAL SURGERY.

IT is well at times to recognise that there are forms of mutual indebtedness between nations which excite no feelings but gratitude. Such are the contributions of each to the common stock of knowledge, and no better example of these could be found than the remarkable development of neurological surgery which the world owes to the United States, and, in particular, to the genius of Dr. HARVEY CUSHING. Many of the fruits of CUSHING'S work during the last 25 years have long been available in his publications and in those of his pupils. There is, however, another aspect of a surgeon's work, and perhaps the most important, which is much less readily communicated to others—his technique. There is no limit to those who can read his papers, but comparatively few are privileged to see him at work and to judge his craftsmanship by the final and inexorable test of its results in his patients. For this reason both surgeons and neurologists will read with great interest Mr. HUGH CAIRNS'S "Study of Intracranial Surgery,"[1] which is an account of his year's experience as assistant resident surgeon in Cushing's clinic. During the year which Mr. CAIRNS spent at Boston, 463 cases were admitted to Cushing's clinic, including 369 belonging to the intracranial tumour group. Of these, 229 were subjected to operation, 284 operations being performed. The case-mortality was 12·2 per cent., and the operative mortality 9·8 per cent., all patients who died in hospital being accounted operative deaths. These remarkable figures, which it is safe to say have never been equalled elsewhere, will excite not only admiration but a demand to know how they are achieved, and of this Mr. CAIRNS'S book is an excellent account. His method has been to let "the cases as far as possible tell their own story," and he includes more or less detailed reports of 40 cases, together with a number of radiograms and other illustrations which have been well reproduced. But the book is far more than merely a clinical review, for he has discerned with insight the principles upon which CUSHING'S success is based, and the cases reported are subordinated to the themes which they illustrate.

Mr. CAIRNS first describes CUSHING'S clinical classification of his cases into "verified," "unverified," and "suspect," and gives a brief account of the development of a histological classification of intracranial tumours to which BAILEY has contributed so much. This is work of far-reaching practical importance, as Mr. CAIRNS points out, for it has been possible to a large extent to correlate the histological structure of the gliomas both with their malignancy and with their naked-eye appearances. Hence, in many cases the surgeon can recognise at operation the nature of the tumour with which he is dealing, estimate the prognosis, and plan his operation accordingly. Mr. CAIRNS next draws attention to a change of diagnostic outlook for which CUSHING and his pupils have been largely responsible. Neurological surgery was at first fully occupied with problems of localisation of tumours by physiological and anatomical methods. Radiography, histopathology, and endocrinology have, however, coöperated with the earlier modes of investigation to present many intracranial tumours in a new light as living objects with distinctive life-histories, thus leading to the recognition of the clinical syndromes produced by such tumours as craniopharyngeal pouch cysts, acoustic neuromas, and a number of others. This knowledge, again, is of the utmost value in preparing the surgeon for the problem with which he will be confronted on opening the skull, for modern diagnostic methods teach him not only the anatomical localisation, but in many cases the nature of the neoplasm. Under the heading Methods of Investigation, Mr. CAIRNS naturally considers mainly the more recent advances in diagnostic method, especially the examination of the fundus oculi, the investigation of the visual fields, X ray examination, and ventriculography. These methods are all by now generally familiar, and it will be agreed that the first three should form part of the routine examination of every suspected case of intracranial tumour. Methods of diagnosis, old and new, however, are of no value unless the surgeon is able to deal with the intracranial tumour which he has successfully localised and exposed. For many years technique has lagged behind diagnosis in neurological surgery. We read, therefore, with special interest Mr. CAIRNS'S account of the principles which underlie CUSHING'S surgical methods—namely, (1) avoiding injury to the brain, (2) hæmostasis, and (3) asepsis and closure of the wound. CUSHING'S patient and painstaking surgical technique is well known. Its profound influence upon the whole work of his clinic is perhaps less fully appreciated. Extremely gentle manipulation of the cerebral tissues and absolute hæmostasis are the two factors which, by largely eliminating shock from CUSHING'S operations, have most directly contributed to a reduction of operative mortality. This has had far-reaching results. Not only has it become possible to remove tumours from the brain with little local or general disturbance, but repeated operations in a short period, which in a profoundly shocked patient would have proved fatal, have been rendered practicable. Thus the surgeon has been enabled to deal with such complications as post-operative hæmatoma. Moreover, a low operative mortality-rate justifies early cerebral exploration and so leads to the removal of tumours at an earlier stage of their development than has hitherto been possible. So much for what has already been achieved. Mr. CAIRNS has something to say also about what may be termed the growing point of neurological surgery, the developments of technique which are at present in the experimental stage. Perhaps the most important of these is the application of the high-frequency current to the removal of tumours. By means of the loop electrode it has been possible to remove piecemeal highly vascular and deeply seated tumours with but little hæmorrhage. This development of diathermy and the as yet almost untried effects of radium may well greatly increase the proportion of removable intracranial tumours.

It is interesting to reflect that CUSHING'S success as a neurological surgeon is to a large extent the expression of the peculiar genius of the American people, which may be summed up in the word "technique." The supremacy of technique in American social and industrial life is obvious. Equally the great contributions of the transatlantic peoples to medicine and surgery have been technical advances, such as the growth of micro-chemical methods, the

[1] A Study of Intracranial Surgery. By Hugh Cairns, M.B., F.R.C.S., Medical Research Council, Special Report Series, No. 125. H.M. Stationery Office. 1928. Pp. 83. 3s.

isolation of insulin, and the liver treatment of pernicious anæmia. CUSHING'S contribution to neurological surgery has been the development of its technique in the widest sense of the word, including not only the diagnostic and surgical methods we have already briefly described, but also the technique of organisation, as expressed in team-work and the documentation of cases. England is notoriously suspicious of technical efficiency and likes to pretend that in this attitude lies the secret of her greatness. But this is a cosmopolitan age in which we so readily adopt our neighbours' vices that we cannot afford to neglect their virtues. It is clearly to the patient's interest that CUSHING'S methods should be practised as widely as possible, though it must not be supposed that English neurology has nothing to contribute to neurological surgery. CUSHING has necessarily been preoccupied with practical considerations and has left untouched many questions of more theoretical interest, which may nevertheless have important practical implications. Neurological surgery, in fact, offers a great opportunity for the union of the different but complementary mental qualities of the American and British peoples For in this realm of therapeutics each operation is an experiment in human physiology, and the greater its technical efficiency the greater the scope it provides for the spirit of physiological inquiry which is the basis and peculiar pride of English neurology.

LONDON CHILDREN AND THE FOUNDLING SITE.

ABOUT a year ago the future of the site of Capt. CORAM'S Foundling Hospital was the subject of keen dispute. This terminated abruptly as far as the commercial participants were concerned, when the Foundling Estates Protection Association was able to secure a Parliamentary veto to a proposal to re-erect Covent Garden Market on the coveted site. Since this time the original buildings have been demolished and several other schemes for utilising the site have been put forward. Of these the most interesting is the suggestion that the historical association of this plot of ground with the restoration of health and happiness to poor children should be preserved, and that the best known hospital for children in the British Empire should be transferred from its present inadequate buildings to new ones to be erected on this space. The Ormond-street Hospital for Sick Children has been making determined efforts to secure the site, for its governors realise the drawbacks of the existing hospital which was founded in 1852. Since that date it has been enlarged three times, not by being rebuilt but by piecemeal additions, with the result that the hospital is a patchwork affair. The position cannot be properly met by reconstruction on the present site in Great Ormond-street. The hospital is hemmed in by high buildings, particularly on the south and west, so that adequate sunlight and fresh air are lacking. These topographical and structural defects, together with insufficient accommodation for the nursing staff, for prosecuting research and for isolating and observing infectious cases, materially hinder the staff of the hospital in carrying out their work. Now, however, a unique opportunity presents itself of providing a building worthy of the hospital's great tradition as a centre of pædiatrics.

The question whether hospitals for children—or indeed for adults—are better situated in the centre of the town, or in the country, is irrelevant, for all are agreed that with the present conditions of staffing and transport large central institutions are essential, though they should be supplemented by country branches. It is hoped eventually to provide accommodation for 500 children at the auxiliary hospital at Tadworth, and perhaps in the far future the London beds of every great hospital will not be occupied for long by any individual patient. This would be a foreshadowing of the day when there will be a regular drafting of all patients that can be moved from the London hospitals to their associated county establishment. But the London hospitals will be the great and original focus, and as far as children's hospitals are in question it is a reproach to Great Britain that visitors from such centres as Vienna, Zurich, and Toronto should have to go to Birmingham or Glasgow to find institutions comparable with those in which they work. One has only to visit the Children's Hospital in Toronto, for example, to realise how woefully London lags behind other cities far less wealthy than itself in the matter of a modern children's hospital.

Within the next two or three weeks the sum required for the deposit money to secure this site will have to be obtained. If it is not, one of the most promising opportunities of our time for restoring sick children to health and happiness will have been lost.

ADENOIDS AND ENLARGED TONSILS.

THE cause or causes of enlarged tonsils and adenoi is are by no means fully understood, and for the past five years a small committee of the Board of Education has been collecting information about them through the School Medical Service. As will be seen from our summary of their interim report (p. 355) no very remarkable facts have yet been brought to light, but evidence is produced in favour of certain conclusions, and plans have been made for further studies. The investigation covered 640 children, of whom 502 were found to have enlarged or septic tonsils, or adenoids, or both. It will be noticed that the Committee wisely included those cases in which the tonsils, though not enlarged, showed signs of sepsis. These 502 children are classified as "cases," and the remaining 138 are called "controls." The cases are divided as follows: 382 had tonsils and adenoids, 47 adenoids only, and 73 enlarged or septic tonsils without adenoids. From these figures it is seen that in a considerable number of cases enlargement of the tonsils was not associated with adenoids, and the Committee believe that in these the causation was probably different—an opinion contrary to that of most laryngologists, who hold that in children enlarged tonsils without adenoids are decidedly rare. The evidence gathered by the Committee suggested that adenoids are usually established before the age of 5, and that they seldom develop after 8 years, whereas the tonsils may become enlarged at any time during school life. There is a definite tendency for more than one case to occur in a family, but there is nothing to show whether this is the result of some hereditary characteristic or of similar environmental conditions. A poor state of health during the first year of life was far more common among the cases than the controls, and was usually attributable to bronchial catarrh; from the early age at which these catarrhal attacks started, they were probably the precursors rather than the consequence of the adenoids. Again, it seems certain that there is some relationship between the common infectious diseases

and the onset of adenoids; sometimes the febrile attack is the immediate existing cause of hypertrophy of the lymphoid tissue, whilst sometimes, perhaps, the presence of enlarged tonsils or adenoids makes a child more liable to infection. A far greater proportion of cases than of controls showed definite signs of old rickets, and it is not impossible that a deficiency of the calcifying vitamin which is known to be the essential cause of rickets may have something to do with nasopharyngeal abnormalities. The investigation was not concerned with very many cases, and has suffered from the further disadvantage that the great majority of the children, when first examined, had already passed the stage of onset. The Committee have therefore decided to proceed with the systematic examination of a series of unselected children from birth, so as to ascertain what factors in the early history and condition of these children can be related to the onset of enlarged tonsils and adenoids. They will also examine a large number of unselected children at 5 years of age in order to learn how often adenoids and tonsils are associated with the bony abnormalities that suggest vitamin deficiency.

HOSPITALS AND THE RATES.

DETAILS of the position of provincial voluntary hospitals in the present alteration of our rating and valuation system are given elsewhere. At the moment many hospitals do not yet know their new assessments, while, of those who know their fate and have appealed against it, many have not yet had their appeals heard. But enough information is available to make it certain that the assessments display a grave lack of uniformity. The Central Valuation Committee was constituted under the Act of 1925 to co-ordinate and advise. It has issued recommendations to local authorities for the very purpose of attaining uniformity. Yet the recent memorandum of the Central Bureau of Hospital Information discloses the widest variation in the scales adopted. For one hospital the scale on which assessment is based is 7*s.* 6*d.* per patient and staff bed; in another it is £5; in another the scale is to be 25 per cent. of the surveyor's valuation—a figure which would probably differ markedly in different localities. There seem to be four different policies possible. The first is to de-rate the hospitals and give them not less privilege in this respect than is enjoyed, for example, by places of worship or Sunday schools under the Acts of 1833 and 1869, or by certain kinds of municipal property. The admitted difficulty of this course is that it is now too late to add hospitals to the subject-matter of the Rating and Valuation (Apportionment) Act of last year, or to vary the lines of the new local government legislation now being fixed in almost final form under pressure of the Parliamentary time-table in a session of which almost every moment is booked. If this course cannot be attained by public Act, it may be possible by local Act, as at Glasgow, where all voluntary hospitals are exempt from municipal rates under a local Act of 1866, and where the Corporation is taking steps to extend the exemption to education, poor, and lunacy rates as well. But local legislation takes time, too, and costs money, and there is no reason why this universal problem should be tackled locally. The second course is to secure preferential assessment on the ground that the work of the hospitals saves the rates. Some hospitals which have a proportion of beds for paying patients favour this second course rather than the first, since they feel it is difficult for them to press for complete de-rating. Here, again, there is a precedent in a local Act; the Halifax Corporation Act of 1920 (10 & 11 Geo. 5., c. lxxvi) allows the infirmary and other local charities to be charged only 10 per cent. of the full assessment charge. The third course is the status quo, mitigated by substantial subscriptions from the local authorities under section 64 of the Public Health Act of 1925, the local bodies thus taking with one hand and giving with the other, but the hospital being left entirely at their mercy and never able to reckon upon a subscription as of right. The fourth course is simply the status quo with no relief whatsoever. If this fourth course is all that the voluntary hospitals have to look forward to, their troubles come at a singularly unfortunate time, when they are threatened with municipal competition. Recent writers—for instance, Dr. Westland Chalmers in his "Hospitals and the State"—surveying the history of hospital organisation and the provision of medical facilities in England, warn us frankly that the ring is being cleared for the final round in the fight between Voluntaryism and State services. Step by step, they say, the development of public medical services and facilities has gone forward irresistibly. The Local Government Bill is a further leap forward. Does the country want to lose its voluntary hospitals? Is it willing to see the burden of the rates used to crush them out of existence?

Annotations.

"Ne quid nimis."

THE KING.

THE official bulletins of the King's health, which appear as usual on another page, bear witness to the successful transfer of His Majesty to his country residence and to the continuance of uneventful progress. Radiological evidence has confirmed the physical examination in showing that the condition of the damaged lung has returned to normal.

IODINE.

IN 1811 a nitre manufacturer in Paris named Courtois, noticing that his vats were becoming corroded, went on to inquire further, and discovered that the copper was combining with some hitherto unknown substance in the alkaline lye of kelp. Two years later, in association with Guy-Lussac, he described the main properties of the new element, iodine, which has since been found to enter in so many ways into the life of man. While the present interest in iodine may centre round its value for preventing or curing goitre, it must not be forgotten that it plays a part in all the metabolic processes of plant and animal life. The vast literature of the subject has been collected and annotated in a recent report [1] by Dr. J. B. Orr and Dr. Isabella Leitch issued by the Medical Research Council. One of the chief difficulties in iodine investigation has been the lack of a method of analysis sufficiently delicate to determine with accuracy the very small amounts of iodine found in plant and animal tissues, but since 1922 the methods introduced by von Fellenberg have opened up new fields of research. In considering the geological distribution, for example, it has been shown that rocks belonging to the same formation from different districts may differ widely in their iodine content. The amount of iodine in soils is larger than that of rocks from which they are derived. This is in part due to the concentrating powers of

[1] Special Report Series, No. 123. H.M. Stationery Office, 1929. 2*s.* 6*d.*

plants, as work at the Rowett Institute at Aberdeen has shown. Heavily cropping the soil tends to deplete it of iodine, and manuring with either dung or artificial fertilisers causes a marked loss of iodine. The amount of iodine in fresh water and in sea water has been the object of much research, but although marine plants are rich in iodine, the common idea that the sea is especially high in iodine content as compared with the land is not supported by facts; the earth's crust and not the sea is "the storehouse of iodine." In this respect it should be noted that in the preparation of salts from natural brines iodine is largely lost, especially in refined salt. In one analysis four different commercial salts were found to contain no iodine at all. A knowledge of this distribution of iodine in nature is important in reference to its occurrence in animal tissues. Diseased tissues, it seems, have a special affinity for iodine, possibly due to a local acidosis in the inflammatory areas.

The effect of iodine on plant growth depends on the dosage used, on the species of the plant, and on the medium to which the iodine is added. There is an optimum dosage which varies from plant to plant to get the best yield in experimental plots. Some plants, especially the beets, are much more tolerant to big doses. This has, of course, a big economic importance, for it has been shown that by iodine-manuring the total sugar yield from beet can be increased by a third. In the metabolism of animals it is very difficult to distinguish between the direct action of iodine and the indirect action through the thyroid secretion. On large animals the effects of iodine on growth appear to give varying experimental results. In three tests at Iowa the administration of potassium iodide was followed by a definite increase in rate of growth, but certain experiments in Aberdeen gave negative results. In children certain tests carried out in goitre areas show improvement in growth, but the very fact that these results occurred in goitre areas suggests that iodine intake was deficient before it was experimentally supplemented. The importance of iodine in development is indicated in the well-known experiments with tadpoles. Metamorphosis in the amphibian depends, under normal conditions, upon the thyroid secretion, and it seems that iodine produces its effects in virtue of the fact that it is an essential constituent of a compound which is normally elaborated in the thyroid. Recent work on the effect of iodine on certain tissues and organs in the normal subject has brought to light some significant facts. Iodine stimulates intestinal movements, and in excessive doses causes diarrhœa. When administered by the mouth potassium iodide causes a rapid rise in the iodine content of the blood, while the effects of iodine on the skin, whether by external application or internal administration in large doses, are well known. These results have possibly more of a therapeutic than a physiological interest; the effects produced by iodine on the sex organs come into both of these categories. It has long been believed that iodine causes injury to the sex glands, but the dosage in most of the recent experiments which appear to support this view is exceedingly high; no injurious effects occur with small or moderate dosage. These facts have a definite importance in relation to the iodine requirements of animals and man. As far as the former are concerned information is meagre. It is comparatively easy to calculate the iodine intake in animals, and this can be shown in certain experiments to vary in a ratio of from 1 to 6 parts per 1000 millions, comparing the iodine intake with the body-weight. Whether this is adequate or not is not known. In the human subject the minimum amount required daily for an adult male is calculated at 15 microgrammes (millionths of a gramme), and for a child about 50 microgrammes. The dosage necessary to prevent goitre is higher, and the lower physiological limit is placed at about 100 microgrammes per day.

The relation of iodine to thyroid secretion and goitre receives close attention in the report. We have concentrated here on some of the other aspects of iodine in agricultural and domestic economy. The importance of mineral balance in dietetics and the part played by iodine in the equilibrium of the animal organism are becoming increasingly recognised. As with vitamins on the organic side, so with iodine on the inorganic side, the infinitely little counts for much.

MINOR LESIONS OF THE FEET.

THE minor lesions of the feet are responsible for such an amount of disability among all classes, and for so much loss of time and inefficiency in many occupations, that the medical practitioner should be sufficiently acquainted with the possibilities of local treatment to know when his patient may be referred to a qualified chiropodist with benefit. Comparatively few members of our profession are aware of the change which is occurring in the practice of chiropody in this country. The chiropodist has in the past been regarded, often with justification, as a quack who, for commercial reasons, usually combined his occupation with that of hairdressing, and it is true that a considerable number of this type of inadequately qualified practitioner still remains. The Incorporated Society of Chiropodists has, however, as its main object the control of the practice of the profession, and aims at placing it upon a strictly ethical basis: the Society has inaugurated schools of chiropody at various centres, each with its attached "Foot Hospital" in which the students acquire their practical training. The courses in these schools reach a high standard and extend over one to two years. The diploma of the Society, by which the fully educated chiropodist may be recognised, is granted both to successful students of the schools and to others on passing a suitable test. To this end a reliable text-book is essential. The third edition of "Practical Chiropody," written by Mr. E. G. V. Runting,[1] has just reached us. Mr. Runting has contributed a useful article on his subject to our columns (THE LANCET, 1927, i., 51), and those who recall its message and desire to learn more details of the type of treatment the chiropodist is capable of carrying out should consult his book. The author has great experience of the subject and has avoided dogmatism where there is room for controversy; the scientific side of chiropody is admittedly in its infancy, and it is too early to adopt stereotyped treatments for many pathological conditions of the foot. The chapter upon the standardisation of terms will be found especially useful, the system given being that adopted at the Foot Hospital.

SYNTHETIC CHEMISTRY 1828–1928.

THE centenary of the synthesis of urea by Fr. Wöhler in 1828 was very modestly commemorated by the Biochemical Society at their October meeting held at Cambridge. Sir F. Gowland Hopkins gave an address, in which he referred to the very slow appreciation of the importance of the nature of the discovery, either by the leaders of chemical thought at the time or by the writers of text-books in the immediately succeeding period. It is, perhaps, fair to state, as does Gowland Hopkins in the fuller discourse published in the current *Biochemical Journal*, that Wöhler himself, although he refers to the synthesis as "merkwürdig," did not see that he had begun to attack "vitalism." It certainly was noteworthy that an attempt to prepare ammonium cyanate by heating the potassium salt with ammonium carbonate should yield a substance which had been known for about 50 years as an important constituent of urine. In 1836, J. Dumas, who had met Wöhler in Paris three years before, had developed so much insight into the problem of "vitalism" as to write "in my belief there are no substances which, in any peculiar sense, are to be called organic. I visualise in organised beings only very slowly working forms of apparatus which act upon materials at the moment of their genesis and thus produce from a very few elements very various organic compounds."

[1] Practical Chiropody. Third edition. By E. G. V. Runting, F.I.S.Ch., Founder and First President of the Incorporated Society of Chiropodists. London: Faber and Gwyer, Ltd. 1928. Pp. 200. 5s.

At the present time vast numbers of organic compounds have been synthesised; in fact, the late Raphael Meldola wrote a fairly thick volume of short descriptions of syntheses of such compounds, and since his untimely death in 1916 many more have yielded to laboratory arts. It must not, however, be thought that great cause for jubilation exists. Nature does all her organic chemistry within a very small range of temperature and with very mild reagents, with very limited variations of pH. Fusions with alkali, treatment with powerful dehydrating reagents, and sealed tube reactions under pressure are unknown to her. In plain fact, the syntheses of the laboratory are almost invariably performed in a manner which would destroy the apparatus in which Nature works. Furthermore, Nature has retained the secret of optical activity, leaving to Art the perpetual disappointment of synthesising racemic forms only. The great value of syntheses, a value far outweighing the commercial advantages of cheap and pure products, is the great light which a not too violent method of artificial formation throws on the constitution of the substance formed and on its affinities with other bodies. It is true that certain well-known vegetable products, such as alizirin, the colouring matter of madder, and indigo, can now be prepared more cheaply and satisfactorily in chemical works than in the field, but this is largely due to the fact that a new scientific industry has competed with and conquered an old empirical one. It is conceivable that the botanist, the biochemist, and the agriculturist may yet find means whereby the leisurely and cosmically economical methods of Nature may again, and this time successfully, be brought into competition with Art, and synthetic chemistry be directed with even greater vigour to its task of discovering absolutely new compounds, which may be, as many have been, powerful agents against disease or useful in the arts. From the synthesis of urea to that of thyroxin about a century elapsed. What will the next hundred years bring?

GANGLIA.

GANGLIA are frequently seen in any surgical outpatient department, but either they have not been studied so carefully and thoroughly as are other less common lesions or their pathology presents exceptional difficulty. At any rate, numerous speculations have been made concerning their pathology, origin, and nature and discarded from time to time. In an exhaustive study recently published,[1] Dr. Louis Carp and Dr. Arthur Stout point out that a ganglion has been called a "knot of tissue" containing "mucoid flesh" (the Hippocratic description), a retention cyst, a neoplasm or degeneration cyst; it has also been described as due to herniation or rupture of a tendon sheath. They themselves believe that ganglia arise by a mucinous degeneration of the collagenous fibrils in the fibrous tissue of joint capsules and tendon sheaths. They have observed under the microscope tiny areas of degeneration which coalesce to form small cysts. In the walls of these cysts the lumen of the vessels is conspicuously diminished by fibrosis, and it has been suggested by some writers that the constriction of these vessels causes local impairment of nutrition and degeneration of the fibrous tissue of the cysts. Dr. Carp and Dr. Stout, however, consider these changes to be secondary because they have found healthy capillaries passing through areas of degeneration, giving them an adequate supply of blood. They make no attempt to explain the cause of the mucinous degeneration. The wall of a ganglion is composed of fibrous tissue and the cavity is lined by a dense smooth, white membrane also composed of fibrous tissue, but in a condensed form. There is no epithelial lining. The cysts do not necessarily communicate with joints or tendon spaces, but they may do so if the degeneration is severe. There is usually a chief cyst surrounded by numerous accessory cavities. Trauma has been suggested as a predisposing cause, but trauma in the region of the wrist is a common occurrence and ganglia relatively rare. A conspicuous feature in the ætiology of ganglia is their occurrence in females of slight build between the ages of 20 and 40. In old age ganglia are rare. The selection of the best method of treatment is of great practical importance. Serious symptoms are rare, and deformity is usually the reason given by patients who want treatment; but interference with function and weakness do occur, and pain may be present in some cases, especially those in which a nerve is surrounded by the ganglion. Since recurrence is usually due to incomplete removal, any operation to be successful must be extensive and often involves a prolonged and difficult dissection. For this reason, and also because ganglia sometimes disappear spontaneously, Dr. Carp and Dr. Stout consider it desirable to reserve operative treatment for those cases which do not yield to simpler methods. They have had fair success from rupture of the ganglion, either by gradual pressure or by a sudden blow, and also from aspiration of the contents followed by injection of an irritant such as tincture of iodine. Pressure should always be applied for some time after any non-operative treatment. When an operation has to be performed a general anæsthetic should be given. These conclusions are based on the late results of 70 cases, and will confirm the impressions of many surgeons whose experience of the results of operation has not been encouraging.

[1] Surgery, Gynecology, and Obstetrics, 1928, xlvii., 460.

THE MENINGOCOCCUS.

Cerebro-spinal fever is a disease of peculiar interest to the clinician, the sanitarian, and the bacteriologist, all of whom should welcome the publication of Dr. E. G. D. Murray's monograph[1] on the organism which causes it. Of the useful "green books" issued by the Medical Research Council, this is the fifth to deal with the disease. The *Diplococcus intracellularis meningitidis* is an obligatory parasite which has never been found apart from human beings; in normal times it lurks among the population of England in an almost imperceptible form, living in a few noses and throats, generally causing no symptoms, sometimes producing a catarrh and occasionally a frank case of meningitis. Under certain circumstances, the most important of which appears to be the close aggregation of large numbers of susceptible people, the organism rouses up, spreads widely through the exposed population, and causes enough cases of meningitis to constitute an epidemic. These striking epidemiological facts have been already largely elucidated by bacteriological methods which alone have made it possible to identify the carriers, and no doubt their further explanation depends mostly on our knowledge of the organism on the one hand, and the reaction of the body on the other. Dr. Murray has brought together all that is known about the organism; his references to clinical medicine, pathology, and hygiene are only incidental, though his last two chapters—on human infection and on diagnosis—are of immediate sanitary importance. He reviews in order the morphology, physiology, virulence, toxin production, and immunity reactions, and in his closing paragraphs points out how the habitual neglect to study the biology of bacteria for its own sake has sadly hampered progress along purely utilitarian lines. It is impossible to notice all the points of interest which arise—the whole should be read as a coherent tale. Most are of specific moment, but scattered about are many items of wider importance—e.g., the possibility of drying the organism without killing it, and the exaltation of virulence which may be produced quite quickly by growing it in leucocyte extracts.

Dr. Murray's book will be very useful to working bacteriologists, but it will not escape criticism in various directions. It contains no summaries for hurried people, and it is not always easy to make out

[1] Medical Research Council Special Report Series, No. 124. H.M. Stationery Office. Price 3*s* 6*d*. pp. 142.

what Dr. Murray's considered opinion really is—for example, as to what really is the best medium on which to grow the organism. His remarks (p. 56) on virulence are obscure, and it is not clear how his own view differs from the traditional ideas which he misstates and condemns. The whole question of virulence and minimum lethal dose, to which he devotes much attention, seems to be in an unsatisfactory confusion. The fatal dose of dead bacteria may be only 20 times the M.L.D. of live organisms, from which we may judge that the mice injected with live meningococci die of poisoning as much as of infection—an old-fashioned distinction to which Dr. Murray might pay more attention. If as much as 4·0 mg. of moist bacteria are needed to kill a mouse weighing 20·0 g. (equivalent to nearly half an ounce for a man), the experimental conditions cannot be thought of as even remotely approximating to the conditions of natural infections. Small wonder that the author concludes (p. 57) that "the measurements of virulence as a laboratory test must of necessity be a death struggle" in which we hope Dr. Murray will be the survivor.

INHERITED RESISTANCE TO INFECTION.

EVIDENCE has been accumulating during the last few years tending to show that the power of resistance to infection is a factor inherited according to Mendelian laws. Up to the present investigations along these lines have been mainly concerned with the exanthemata and the results have been far from conclusive. Recent investigations on the incidence and severity of tuberculous infection in members of the four blood groups promise to throw more light on the matter. The results of this work were first published in the course of the past year by Z. Swider and N. Kon,[1] and seemed to show clearly that members of Group A (II Moss) were more susceptible to this type of infection than those of the remaining three groups. More recently the same authors, in conjunction with Mlle. M. Mancewiczowna, have studied the matter from another angle.[2] Taking 300 tuberculous patients, they divided these according to the stage of the disease into Turban's three classes. On investigating the blood groups of all these patients they found that, whereas in Groups O and B there was a steady decrease in the percentage from Turban's Class I. to III., in Group A the reverse was the case. Thus while in Groups O and B the percentage in Class I. were respectively 31 and 20, and in Class II. 25 and 16, in Group A the percentages in Class I. was 43 and in Class III. 52. In Group AB the percentages in all Turban's classes remained approximately the same; the figures, however, are necessarily small for this group. The authors regard these figures as showing a failure of resistance to tuberculous infection on the part of members of Group A. On this assumption an unduly high percentage of members of Group A should be found among the graver and a lower percentage among the milder cases of tuberculous infection. Since the mild and early cases are to be found attending dispensaries and the grave and late cases in hospital wards, the percentage of Group A patients should be lower among the former and higher among the latter class. This the authors found to be the case. Among the 300 cases in Group A 39 per cent. were ambulant and 54 per cent. warded in hospital; of Groups O and B, 32 and 20 per cent. respectively were attending dispensaries and 24 and 15 per cent. warded in hospital. Of members of Group AB the numbers warded and ambulant were about equal. The total number of cases investigated is too small to justify final conclusions, but so far as the investigation goes it seems to indicate a lack of resistance to tuberculous infection on the part of members of Group A. The few figures for Group AB suggest that this group, too, does not enjoy the resistance shown by Groups O and B. The implication of a genetic linkage of low immunity to tuberculous infection with the A agglutinogen is clear; confirmation of these results and further investigation as to whether the low immunity is special for tuberculous or general to all types of infection should follow.

[1] Compt. rend. de la Soc. de biol., 1928, xcviii., 385.
[2] Ibid., 1928, xcix., 1023.

THE MONKEY AS FRIEND AND ENEMY OF MAN

AN American advocate has recently argued that the theory of evolution gives the orang-utan a legal status, but the learned judge disallowed the plea. The public health status of the anthropoid apes and monkeys has been almost as much neglected as their legal position. Although they are, in fact, our nearest relations, we have been far more friendly—as is so often found amongst relations—with remoter animals. The domesticated species have for long been studied and the diseases that they can convey to man, with or without suffering themselves, are fairly familiar. The Tropical Section of the Royal Society of Medicine remedied this omission last week when it held an inquiry into the danger to man of monkey diseases and infestations.

The obvious grouping for diseases of this kind is: those from which both monkeys and man suffer: those peculiar to man but sometimes found accidentally in monkeys, and vice versa; and those which can be experimentally conveyed to monkeys from man although the animal is not naturally subject to them. The outstanding example of the first group is tuberculosis, and there is no doubt that in this case the greater sufferer is the monkey. There is no certain evidence that the animal in the wild state ever contracts the disease, but once it is captured, kept for awhile in the squalid conditions of a coast native's hut, and shipped abroad, perhaps under shocking conditions of travel, the human bacillus plays havoc. Only the pathologist who has opened the body of a menagerie monkey can believe the extraordinary degree of dissemination that is seen. Some of the specimens brought from the Zoological Society's prosectorium by Col. A. E. Hamerton illustrated this very vividly. The bovine bacillus is equally virulent, although there is less likelihood of exposure to infection. From the public health point of view, the pet monkey constitutes a danger to its owners unless its history from the time of captivity is above suspicion. The danger is increased by the extraordinary fact that a monkey riddled with tuberculosis may appear perfectly healthy until the day of its death. Monkeys in captivity are also susceptible to pneumococci and streptococci, and *B. aertrycke* and Flexner's bacillus have been isolated from the fæces. It is conceivable that they might act as carriers of pneumonia or dysentery if kept in close contact with man, but the risk is obviously not great. It seems probable that they may harbour the histolytic amœba without suffering from acute disease, and trypanosomes apparently identical with *T. gambiense* and *T. rhodesiense* have been found naturally in them. Our knowledge is, however, distinctly vague and uncertain until we come to helminthology. With Dr. T. W. Cameron's recent discovery of *Schistosoma mansoni* in the blood of African monkeys living in St. Kitts, a grave indictment has been brought against the monkey tribe. Bilharziasis is endemic in the West Indies and, so long as the monkeys carry the organism, the disease cannot be eradicated by measures directed against the human hosts alone. Dr. Cameron strongly suspects, also, that African monkeys in their native home carry *Schistosoma hæmatobium* as well as *S. mansoni*, and it would be well worth while for local investigators to confirm this. Whipworms, though common both in man and monkey, probably cause little disease, but the life-history of physaloptera requires further study, as it has some local hygienic importance in Africa and probably infests an intermediate host. The louse is a potential carrier of disease, and the human forms have a peculiar distribution among the great apes and the African spider-monkeys which might prove significant under certain circumstances. India, it must be remembered, has a peculiar problem of her own, since in many parts the langur or grey monkey is regarded as sacred and large numbers of semi-domesticated

macaques, or little brown monkeys, live in close contact with the people. In India, every monkey disease is a potential danger to man in a way that it cannot be in countries where intimate contact is confined to a few isolated pets. The general charge against the monkeys is, therefore, that they act as reservoir hosts, certainly for bilharzia, and possibly for rabies, trichocephalus, and yellow fever.

The defending counsel would be able to put up a very good case for the value of his client, the monkey, to man. The whole tale of our research into and knowledge of certain terrible diseases of man depends upon the simple fact that they are transmissible to monkeys in the laboratory. Thousands of monkeys have lost their lives from diseases which they would never encounter naturally, in order to save mankind from the ravages of poliomyelitis and yellow fever, and even when the disease is one that other laboratory animals will take, the monkey is often preferable because its illness more closely resembles that of man. Prof. E. Hindle declares that his work on yellow fever, the good results of which can hardly yet be estimated, was wholly based on the discovery that monkeys could be infected. An interesting contribution to scientific knowledge is offered by the study of monkey diseases and parasites. Dr. V. B. Wigglesworth pointed out that the distribution of lice has a definite phylogenetic significance and Dr. Cameron said the same of the helminths. The parasitologist and epidemiologist have a contribution to make to the study of evolution which has hitherto been neglected. It may well prove true also that the study of evolution and animal relationships would throw some light upon the distribution of disease and the lines along which it may be expected to attack.

THE MECHANISM OF THYROID SECRETION.

THE results of some researches recently published by R. J. Ludford and W. Cramer[1] shed light on the differences in the mechanism of secretion of the thyroid gland in the normal gland and in exophthalmic goitre. Recent cytological work has shown that the products of secretion in the thyroid cells accumulate in relationship to the Golgi apparatus which is normally situated between the nucleus and the alveolar secreting surface of the thyroid cell. During secretory activity droplets appear in contact with the Golgi apparatus and pass out into the cytoplasm towards the lumen of the alveolus. The position of the Golgi apparatus, therefore, gives a clue to the direction of the process of secretion. To exclude the possibility of a normal alteration in position of the Golgi apparatus Ludford and Cramer induced long and severe activity in the thyroid cells of rats by exposing them to cold in an ice-chest, sometimes after epilation. Sections of the thyroid of rats so treated, although they showed some evidence of displacement of the Golgi apparatus in a few cells, showed no signs of definite double polarity. It is concluded from this that in normal cells, even after great secretory activity, there is no alteration in the direction of the discharge of secretion. The position of the Golgi apparatus was next studied in a mouse that had spontaneously developed all the cardinal signs of exophthalmic goitre, and also in glands recovered from human beings with this disease. In the mouse the gland showed a remarkable deviation from the normal structure, especially as regards the Golgi apparatus, which often exhibited a complete reversal of polarity, being directed towards the capillaries instead of towards the lumen of the alveolus. Moreover, droplets of secretion could be seen in contact with the Golgi apparatus of these displaced cells, a condition not observed in normal over-stimulated cells that were a little displaced. A similar state of things was observed in sections from the thyroid of human exophthalmic goitre, except that droplets of secretion in contact with the Golgi apparatus were rarely seen. The investigators attribute the absence of droplets to the fact that iodine had been given before operation. They suggest that these findings indicate that in the normal thyroid gland the secretion passes into the alveolar lumen first, even during prolonged activity, and is then passed on into the blood; whereas in exophthalmic goitre the secretion goes directly into the capillaries. Thus the hormone that passes directly into the capillaries in exophthalmic goitre may be chemically different from that which in the normal gland only passes via the alveolus. This would coincide with views previously expressed that exophthalmic goitre is not due to an increased secretion of the thyroid gland, but to a slightly altered hormone.

[1] Proc. Roy. Soc. B., 1928, civ., 28.

THE DOCTOR AS PATIENT.

MUCH has been written about the psychological relation of the patient to his doctor, and the elements of it are well recognised. Its roots lie in that suggestibility which is prominent in the mentality of practically everyone, and which is, moreover, accentuated and focused by sickness until it dominates every other motive. All experienced clinicians know that the "confidence of the patient" may determine the success of the treatment, and the phenomenon has been further illuminated by the modern psychotherapists, whose object from the start is to secure a satisfactory "transference" of the unconscious infantile dependence of the patient to their own personality. What is not so often discussed is the manner in which this relation is modified when the patient is himself—or herself—a doctor. Prof. Theodor Brugsch [1] finds that the all-important element of confidence is practically annihilated. The doctor knows too much. He has reassured too many patients himself, he has too close an acquaintance with their minds and the irrational way in which it pays to deal with them to put any trust whatever in the method when applied to himself—and he assumes a priori that it will be applied to himself. The result is, says Prof. Brugsch, that a sick doctor is never the patient of the colleague who is treating him. He remains his own patient, unless the colleague is very strong-minded and eminent, or the sick doctor is too ill to criticise. The psychological rôles are reversed; the patient is the dominating partner and the physician the dominated, in proportion among other things to their relative ages. Moreover, as every doctor knows, an integral part of the treatment of many patients is the correction of false ideas about their condition. When the patient is a doctor his ideas are rather more erroneous, if anything, than they would be if he were a layman, and they are infinitely more troublesome to over-rule. If the colleague in charge is a younger man to do so may be impossible. Another factor which makes the treatment of a colleague difficult is the extreme reluctance of any doctor to admit that he is ill. The result is that he does not become a patient until he is so bad that he is the worst judge of his own condition, the more so since he had deceived himself about it from the beginning. Nevertheless, the fault is not all on the side of the patient. A great and very general mistake in the doctor who treats a colleague is, according to Prof. Brugsch, the assumption that the sick man must, because he is medical, be regarded as in some way different from an ordinary lay patient. The physician begins by making the cardinal blunder of taking his patient into consultation and treating him as a scientific equal. He assumes that his treatment must for this reason be instantly intelligible and acceptable, while from the nature of things it is most unlikely to be anything of the sort.

The conclusion Prof. Brugsch comes to is rather surprising. He does not suggest a remedy for this state of affairs except that both sides should recognise it and be on the look-out for its manifestations, and that the doctor who becomes ill should, as a doctor, forbear from treating himself but rather take the valuable opportunity of enlarging his knowledge of human nature by observing his own experience as a patient. What Prof. Brugsch does see in the situation is a reason for the almost universal custom of refusing to take a fee for services to a medical colleague.

[1] Deutsche Medizinische Wochenschrift, 1929, lv., 27

THE CHLORINE TREATMENT OF DRINKING WATER.

NASCENT oxygen has proved to be so truculent an enemy of bacterial life that it may come to be regarded as one of mankind's chief aids in his struggle with the lower fungi. The potency of oxygen as elaborated from water by the action of chlorine or its compounds is not determined by its concentration as in the case of mere chemical disinfectants, for the onslaught on bacterial life continues unabated until the last molecule of oxygen has disappeared, while after disinfection is complete there is no poisonous or unpleasant remainder except it may be in the case of certain trade effluents. Hence it is that the use of chlorine for water purification is gaining in popularity every year.

It was at Lincoln in 1905 that Sir Alexander Houston first used an alkaline hypochlorite solution, containing 12 to 14 per cent. of available chlorine, to sanify the drinking water in the face of an emergency created by an epidemic of typhoid. Chlorination was adopted during the late war as an interim measure for London river water and has never been discontinued. Now in many parts of Europe, Asia, and America chlorinators have been installed on a large scale. Quite recently, for instance, the water-supply of Santiago (Chili) has been disinfected with, it seems, an immediate decrease in the rate of infant mortality. In Bogotá (Colombia) typhoid fever diminished rapidly as soon as the aqueduct water was chlorinated. In the United States of America 70 per cent. of the population are supplied with drinking water that has been treated with chlorine. The procedure varies from place to place. In some a minimal amount of chlorine is merely added to the clear and colourless filtered water as a final safeguard against accidental contamination during distribution. In others the chlorine is introduced to the raw water prior to filtration. In yet others a large excess of chlorine is added to destroy algæ as well as bacteria, the excess being subsequently removed by treatment with some other chemical agent such as sulphur dioxide. There has been similar variety as to the form in which the chlorine is presented. On the largest scale chlorine gas compressed into liquid form is the simplest and most effective form of chlorination. In Central and South America, as well as in other countries at a distance from places where liquid chlorine is manufactured, the product resulting from the electrolysis of sea-water has been used as a substitute; while in France resort has naturally been taken to the hypochlorite solution known as *eau de Javel*, which has long been in use as a cheap and harmless disinfectant in the home. On another page Mr. T. H. Bishop describes a simple but very ingenious apparatus for the *javelisation* of drinking water as it is practised in Rheims. This apparatus, as the illustration shows, does not involve the use of anything except the simplest material and a primitive type of installation. Another simple form of apparatus for the same purpose has been recently described [1] by Major E. W. Wade, R.A.M.C., the mother type of all these apparatus being that set out by Houston in the sixteenth annual report of the Metropolitan Water Board.

On active service the conditions are very different, and any feasible method of preparing potable water implies the use of some compound containing positive chlorine which is solid at ordinary temperatures and pressures. Bleaching-powder, however cheap and accessible, has proved too erratic in use as a water disinfectant; chloramine and halazone, which have been tried abroad, act too slowly to be safe in emergency. In a recent number (October, 1928) of the *Military Surgeon* Major Cyrus B. Wood, of the U.S. Army Medical Corps, makes a strong claim for succinchlorimide as a chemical agent for the preparation of potable water. This is a colourless crystalline compound with a slight chlorous odour, a melting-point of 148° C., readily soluble in one hundred parts of water. It seems to possess the qualities of a useful water steriliser—namely, prompt reaction, stability on prolonged storage, and non-toxicity towards the human body. Its stability is such that, on exposure to air and light (other than direct sunshine) at 50 per cent. humidity for 50 days, succinchlorimide only lost 0·78 per cent. of its original chlorine, while halazone lost 1·7 and bleaching-powder 22·8. Major Wood concludes that succinchlorimide is a compound suitable for the preparation of small quantities of potable water.

[1] Jour. R.A.M.C., October, 1928.

AT the Royal College of Physicians of London, Pall Mall East, the Milroy Lectures will be delivered by Dr. J. Graham Forbes on Feb. 26th, 28th, and March 5th; his subject will be Past and Present Diphtheria in England and Wales, with special reference to the London Metropolis. On March 7th, 12th, and 14th Prof. E. B. Verney will give three Goulstonian Lectures on Polyuria. The Lumleian Lectures on March 19th, 21st and 26th will be a Medical Review of the Surgery of the Chest by Dr. R. A. Young. Dr. F. M. R. Walshe will deal on April 30th and May 2nd in his Oliver-Sharpey Lectures with the Physiological Analysis of some clinically observed Disorders of Movement. The Croonian Lectures will be delivered on June 4th, 6th, and 11th by Dr. H. H. Dale, F.R.S., who has chosen as his subject Some Chemical Factors in the Control of the Circulation. The time in every case is 5 P.M., and any member of the medical profession will be admitted on presentation of a visiting card.

Lord Beaverbrook's recent gift of £22,800 for medical education has been allocated by the Prime Minister to the following institutions: The Royal Society of Medicine, £2800; the Royal College of Physicians, the Royal College of Surgeons, the Medical Faculties of the Universities of Oxford, Cambridge, London, Durham, Manchester, Birmingham, Liverpool, Leeds, Sheffield, Bristol, St. Andrew's, Glasgow, Aberdeen, Edinburgh, and Wales, the Cancer Hospital, Epsom College, and Queen Charlotte's Hospital National Mother-Saving Campaign, £1000 each. The grant to be applied for special purposes beyond the capacity of the ordinary income of the institution—e.g., on studentships, research, or contributions to scientific equipment.

TWO anonymous donors have each given a gramme of radium to the London Hospital. One of them, who previously gave £50,000 to endow the hospital's Freedom Research Fund, has also given a further £13,000 to establish and maintain a laboratory for the production of radon, this work being carried out under the name of the Freedom Radium Fund. The cost of one gramme is about £12,000.

THE Royal Free Hospital, London, has received from its chairman, Mr. Albert Levy, the sum of £50,000 as a contribution to the fund for rebuilding the hospital's maternity department, and for research into the causes of maternal mortality and of invalidity.

CUMBERLAND COUNTY HOSPITAL.—The new out-patients' wing of the Cumberland County Hospital was opened on Feb. 7th by Mr. Theodore Carr, on the occasion of the centenary of the foundation of the institution. The new wing cost £33,000, and is part of a general scheme costing £70,000.

SUSSEX PROVIDENT SCHEME.—The prediction made in 1921, when the late Dr. J. F. Gordon Dill launched this scheme for hospital and specialised medical services, that in a very few years it would benefit the hospitals to the extent of £10,000 a year, has been more than fulfilled. In 1928 the coöperating hospitals received no less a sum than £11,142. The largest payment during that year was £4286 to the Royal Sussex County Hospital, Brighton, whilst the Royal Alexandra Hospital for Sick Children received £1628, and the New Sussex Hospital for Women and Children £1266. The sum of £850 was paid to the Hove Hospital, and three other institutions received over £500 each.

The Clinical Interpretation of Aids to Diagnosis.

A Series of Special Articles contributed by Invitation.

XXII.—THE CLINICAL SIGNIFICANCE OF THE BLOOD-UREA CONTENT.

THE estimation of the blood-urea has become a commonplace of ward work with the advent of methods which permit the utilisation of small quantities of blood but yield accurate results. It has indeed long been recognised that urea accumulates in the blood in certain types of renal disease, but the large quantity of blood needed and the labour involved militated against the use of routine estimations of the blood-urea in clinical medicine. It is not proposed to discuss in detail the numerous methods of urea estimation which are now employed, but it may be mentioned that they are of two main types. In the first, which was used by Widal in his classic work on renal disease, hypobromite is added to the deproteinised blood and the nitrogen evolved is estimated: in the second, which we owe to Marshall, Folin, and Van Slyke, the urea is decomposed either by the ferment urease or by the autoclave, and the ammonia formed estimated colorimetrically after Nesslerisation or by volumetric titration after distillation into acid.

The Normal Blood-urea.

Before considering the clinical significance of the urea content of the blood, it is necessary to form some idea of the factors which in health maintain it at a fairly constant level. We have on the one side the formation of urea in the katabolism of proteins; on the other, the excretion of urea by the kidneys. The blood-urea content represents a balance between these two activities. Let us first consider the activity of the kidney.

No evidence has been adduced which suggests that urea is treated by the kidney as a threshold substance. While such useful bodies as sugar or sodium chloride are conserved, and not excreted by the kidney unless their concentration in the blood exceeds a certain threshold value, urea is, from the kidney standpoint, a purely waste body to be excreted however low the blood-urea content. It is not, apparently, a function of the kidney to maintain the blood level at a "normal" level. Since, however, the rate of excretion of urea tends to bear a direct relationship to the concentration of urea in the blood, with a healthy kidney and an average diet, the blood-urea content tends to remain within certain definite limits. A further point of great practical importance is that adequate water must be available for excretion if the blood-urea is to be kept within these limits. If, for instance, we assume that 30 grammes of urea are being formed in the body daily, and that the kidney can concentrate urea in the urine to the high figure of 5 per cent., it is obvious that 600 c.cm. (20 oz.) of urine at least must be excreted per diem if a balance is to be struck between urea formation and excretion. If less water than this is available, urea will accumulate in the body and the blood-urea will rise.

The effect of the diet on the blood-urea is not of any great importance from the point of view of the clinician. It is true that, even in healthy persons, by raising or lowering the protein intake the blood level may be raised to a level of 50 mg. or dropped to as low a figure as 12 mg. per 100 c.cm., but such variations are not seen on anything approaching an average diet. The only variation commonly met with, which may reasonably be attributed to an alteration in the amount of urea formed in the body, is the low blood-urea of the later months of pregnancy. The blood-urea of the pregnant woman may fall to as low a level as 10 mg. per 100 c.cm., probably owing to the demands of the growing fœtus on the protein of the maternal diet. The above points have merely been emphasised in order to draw attention to the fact that causes outside the kidney may lead to alterations in the blood-urea content. One further important consideration must be mentioned—the large factor of safety in the renal tissue available. So large is the excess of kidney substance over the necessary minimum that one kidney suffices to ensure adequate urea excretion. The blood-urea does not therefore rise after a unilateral nephrectomy.

In hospital patients on an ordinary ward diet the blood-urea content will usually be found to lie between 20 and 40 mg. per 100 c.cm (0·02 to 0·04 per cent.); in strictly healthy young adults in a fasting state between 20 to 30 mg. For our purpose we may regard any figures over 40 mg. as excessive.

Uses of the Blood-urea Estimation in Clinical Work.

Blood-urea estimations are employed by the clinician in the diagnosis and prognosis of nephritis in the examination of patients suffering from surgical affections of the urinary tract, and, lastly, in the diagnosis of uræmia from other conditions. Under this last heading we have to consider possible extra-renal causes of urea retention. Let us first discuss the question of nephritis, assuming that our patient shows symptoms suggestive of that disease, and that his urine contains albumin and casts. Under such conditions any urea accumulation found may fairly be attributed to renal inadequacy.

The Blood-urea in Nephritis.

The two main types of renal inadequacy were first differentiated by Widal, and are too well known to need elaboration here. Suffice it to say that in the first, or azotæmic, retention of urea and other waste nitrogenous bodies is present, while in the second, or hydræmic, water retention, without appreciable accumulation of urea in the blood, is the main feature of the disease. We are concerned here with the first of these two forms of renal failure, but it may be mentioned that in the hydræmic patient a moderate increase in the blood urea, to such a figure as 50 mg., may be found. Such accumulations are merely the result of the oliguria, the concentrating power of the kidney remaining intact and the percentage of urea in the urine high. The azotæmic form of renal inadequacy on the other hand is characterised by an absolute inability to excrete a concentrated urine. The main forms of renal disease in which this inability to concentrate and excrete urea is present are chronic interstitial nephritis, acute and subacute glomerulo-nephritis, pyelonephritis, and polycystic kidney. In assessing the significance of any blood-urea figures found, it is, in the first place, absolutely essential to arrive at an idea of the type of disease present. In interstitial nephritis and polycystic kidney we are dealing with steadily but slowly progressive lesions, in acute glomerulonephritis with a disease in which very rapid changes for better or for worse are possible, and in pyelonephritis with a lesion capable of rapid extension. It is in the relatively stable conditions first mentioned that the estimation of the blood-urea is of most value. The laboratory worker, if asked for his opinion as to the significance of the figures found, is entitled to all available information as to the pathological condition present.

In drawing conclusions from the blood-urea content in cases of acute glomerulonephritis certain considerations must be kept in mind. In the first place, extreme oliguria is usually present, and the rise in the blood-urea may be due as much to inadequate water excretion as to impaired concentrating capacity. Secondly, rapid improvement and a sudden diuresis may set in at any time. As a result, prognosis based on the blood-urea content is far from certain. It is in this disease, especially in childhood, when extraordinary reparative capacity is present, that we see the highest blood-urea accumulations followed by recovery. As a rule, a blood-urea content above 300 mg. indicates a

fatal result, but recovery may occur even though a level of 400 mg. has been reached.

It is in interstitial nephritis and in the polycystic kidney that the blood-urea estimation finds its most valuable clinical application. Polyuria is the rule in these conditions, urea excretion is not therefore hampered by inadequate passage of water, and the blood-urea gives a true picture of the state of the renal function. The presence of albumin and casts in the urine of a middle-aged man, associated with a raised blood pressure, does not necessarily imply gross functional damage to the kidney. It is not unusual to see cases of hypertension in which dyspnœa and œdema, actually cardiac in origin, have been attributed to renal failure and regarded too pessimistically, while one also frequently meets with patients in whom, owing to absence of blood analysis, symptoms have been misinterpreted which should have served to indicate the imminence of a fatal uræmia. Lastly, chronic interstitial nephritis is a disease in which the renal function tends to slowly and steadily deteriorate, and in which the course, apart from certain accidents, can be fairly accurately prognosed. The rules of prognosis, laid down by Widal for these cases, seem to me to be still valid. With a blood-urea above 100 mg. life is rarely prolonged for more than two years, with a blood-urea above 200 mg. death may be expected within six months, while minor accumulations up to 100 mg. are of no prognostic significance. It is advisable to base one's decision on two estimations, made at intervals of about a month, if one wishes to avoid mistakes due to temporary exacerbations, and to form some idea of the rate of progress of the disease.

Retention of Other Nitrogenous Waste Bodies in Renal Disease.

Creatinine.—In estimating urea we are not estimating a body which is in itself toxic and which will infallibly kill our patient when it reaches a certain level in the blood. We are merely using the accumulation of a waste product in the blood as a measure of the degree of renal inadequacy. Now, since the amount of urea formed varies with the protein content of the diet, the load of urea presented to the damaged kidney for excretion is very far from being a fixed quantity in different individuals or in the same individual from day to day. Of all the nitrogenous waste bodies present in the urine, creatinine shows the most constant daily excretion on a creatinine-free diet. The blood creatinine content has therefore been suggested as a more satisfactory index to the degree of renal inadequacy present than the urea content. Creatinine accumulates in the same types of renal disease as does urea and has been found to possess a very considerable prognostic significance. A creatinine content in excess of 5 mg. (normal 1·2 to 1·5 mg.) indicates in chronic nephritis that death will take place within a year.

Uric Acid.—For the third nitrogenous waste body, uric acid, a different significance is claimed. It, too, accumulates in the blood of the interstitial nephritic, and it is contended that of these bodies it is the one which is concentrated by the kidney from blood to urine with most difficulty. According to some authors, therefore, uric acid will tend to bank up in the blood at a stage of the disease at which urea is still satisfactorily excreted, and an excess of uric acid will be the first indication of renal failure. Actually it would seem doubtful whether estimations of these two bodies add appreciably to the information which may be derived from the simpler blood-urea determination.

The Blood-urea in Urinary Surgery.

Since one intact kidney amply suffices to keep the blood-urea within normal limits, it follows that an increase in the blood-urea above the normal figure indicates an affection involving both kidneys. This rule finds a certain surgical application in renal tuberculosis or calculous pyelitis, but the relative efficiency of the two kidneys is more satisfactorily studied by ureteric catheterisation after administering a dose of 15 grammes of urea. Under these conditions a urinary urea concentration of 2 per cent. and upwards during the second hour may be taken as indicating an adequate efficiency in the secreting kidney.

The blood-urea examination is of more value in prostatic disease in which any renal damage present is bilateral. In the prostatic case we have two main renal conditions to consider; in the first place, the interstitial nephritis which follows long-continued obstruction, in the second, pyelonephritis. Of the possibility of the sudden onset of the latter, blood-urea estimations can, of course, give us no warning though they may indicate the existence of the former. It is generally accepted that with a blood-urea above 50 mg. the state of the kidney is such as to indicate caution in surgical interference, that is, a two-stage operation. Further estimations after the first stage will indicate any renal improvement and the time at which removal of the prostate may be undertaken.

Extrarenal Causes of Urea Retention.

Up to this point we have dealt with accumulations of urea in the blood of patients in whom the diagnosis is established. We have assumed that the patient suffers from some renal lesion in which failure of urea excretion is known to occur and have tried to assess the value of the findings as a guide to prognosis or treatment. Let us now consider the case of the patient in whom the diagnosis is in doubt and in whom a blood-urea estimation has been made as part of the routine examination. Let us suppose that the blood-urea content has been found to be above 100 mg. per 100 c.cm. Are we at once to assume that we are dealing with a case of serious renal impairment, and to plan treatment accordingly? The answer is emphatically in the negative, since in several conditions which may clinically suggest uræmia a high blood-urea may be met with though actually the kidneys are intact. We may, for instance, be called to a patient in middle life suffering from incessant vomiting with a trace of albumin in the urine. We find this blood-urea content to be 100 mg. per 100 c.cm. and diagnose uræmia, only to discover later that he is actually suffering from intestinal obstruction.

Desiccation Urea Retention.—There are, in fact, a whole series of conditions in which inadequate water is available for excretion of urea and in which the blood urea reaches a high level as the result, even though no renal lesion is present. The rise in the blood-urea is favoured by the fact that desiccation in itself leads to excess in katabolism of protein and to excessive urea function. The unfortunate kidney is thus faced with an added demand on its excretory functions at the very time at which it is least able to meet it owing to an inadequate supply of water for excretion. Among instances of such "desiccation," urea retention, one may mention intestinal obstruction, general peritonitis, diabetic coma, gastro-enteritis in childhood, and cholera. Very high blood-urea contents may also be seen in comatose patients whose fluid supply has been inadequate.

Though at first sight it might seem that such accumulations must lead to hopeless confusion, this is not actually the case. Retention of urea due to actual renal lesions is always accompanied by inability of the kidney to concentrate. In the "desiccation" retentions the concentrating faculty remains good, and if a specimen of the urine is obtained it will be found to show a urea concentration of 3 per cent. and upwards. By a simple hypobromite estimation of the urinary urea we can therefore pick out this group from the true uræmics. The indication is, of course, to supply fluid by any possible route, since in addition to urea other waste bodies are retained and an acidosis similar to that of uræmia develops. Similar but smaller accumulations may be met with in cardiac disease with decompensation and oliguria—such figures as 50 to 60 mg. being not uncommon.

In cases, therefore, in which the blood-urea has been estimated as a diagnostic procedure and found to be above the normal upper limit of 40 mg., it is advisable

not to be content with this finding alone, but to control the conclusions drawn from it by an estimation of the concentration of urea in the patient's urine. It is hardly necessary to add that the ordinary clinical examination for albumin, casts, &c., must not be omitted. In the presence of a high blood-urea and a low urinary urea concentration, the physician may rest assured that he is dealing with true renal inadequacy. If these considerations are borne in mind, the blood-urea estimation is as valuable an aid in the diagnosis of certain obscure cases as it is in the prognosis of chronic nephritis.

O. L. V. DE WESSELOW, B.M. Oxf.,
F.R.C.P. Lond.,
Physician with Charge of Out-patients, and Chemical Pathologist, St. Thomas's Hospital.

Special Articles.

ADENOIDS AND ENLARGED TONSILS.

INTERIM REPORT BY THE BOARD OF EDUCATION'S MEDICAL COMMITTEE.

IN 1924 Sir George Newman arranged for four small medical committees, consisting of officers of the medical branch of the Board of Education with clinical experts and representative school medical officers, to consider four subjects requiring further investigation in order to enable the Board and the medical officers of the local education authorities to perform their duties more effectually. The committees were to be of an informal nature and form part of the scheme for "field" research into those aspects of the work of the school medical service (including the abnormal child) on which knowledge was inadequate. The subjects to be dealt with by this means were (*a*) the prevention of adenoids and enlarged tonsils, (*b*) the prevention of defective vision and squint, (*d*) an anthropometric survey of a large group of children of school age, and (*d*) the problems presented by the mentally defective child.

The Committee and its Reference.

The first of these committees, which has now presented an interim report,[1] consisted of Sir George Newman, chairman; Dr. R. H. Crowley (Board of Education), vice-chairman; Dr. D. Forsyth (physician, Charing Cross Hospital); Mr. H. Bell Tawse (aural surgeon, Nottingham Education Committee); Dr. C. J. Thomas (senior medical officer, L.C.C.); Mr. H. Tilley (surgeon to ear and throat department, University College Hospital); Dr. A. Warner (school medical officer, Leicester); with Dr. H. C. T. Langdon (Board of Education), secretary. This committee was asked to inquire into the incidence of, and physical and environmental conditions associated with, enlarged tonsils and adenoids, and into the methods and results of treatment.

The Ætiological Problem.

The Committee's investigation revealed no dramatic difference in the social circumstances or environment of children suffering from enlarged tonsils and adenoids as compared with other children. The evidence so far accumulated suggests that the ætiological problem is similar in some respects to that of dental disease, in that both conditions affect all classes of society without any conspicuous difference in incidence; that there is a definite tendency for certain families to be affected; and that the cause in a considerable number of cases obviously begins to act in antenatal or early postnatal life. The report adds that the frequent association of these two conditions suggests either that the one affects the other, or that there is a common cause, or both.

[1] Board of Education. Interim Report of the Medical Committee on Adenoids and Enlarged Tonsils. H.M. Stationery Office. 1929. 6*d*.

The antenatal and early postnatal history of these cases indicates that they start life with a slight but perceptible handicap. Prematurity, artificial feeding, defects of environment are slightly but consistently commoner than among normal children. The onset of adenoids appears to be preceded by catarrhal affections of the nasal passages. These attacks may be due to an abnormal susceptibility of the mucous membranes during the first years of life, the result perhaps of a lowered vitality, the causes of which have not yet been made clear. Alternatively they may follow a chance infection of normal mucous membranes, a possibility indicated by the very considerable proportion of cases in which an attack of infectious disease is the immediate precursor of adenoids. The apparent association of enlarged tonsils and adenoids with rickets suggests the possibility that a deficiency of the calcifying vitamin D may play some part in the ætiology of this condition. This is a matter which in the opinion of the Committee deserves careful investigation.

There are two lines of investigation which should go far in the Committee's opinion towards settling this matter. One, carefully controlled, should be carried out on similar lines to that already done by Dr. G. C. M. M'Gonigle, in order to check his results, and to determine whether the slighter signs of rickets are generally present with enlarged tonsils and adenoids; the other should be directed to ascertaining whether an adequate supply of the calcifying vitamin from the earliest years of life tends to prevent the onset of adenoids. An investigation on these lines having reference to the origin of dental disease is actually in progress at certain institutions in Birmingham under the auspices of the Medical Research Council, certain groups of children being supplied regularly with an additional amount of the calcifying vitamin, while others similarly circumstanced remain on the standard diet.

The fact is emphasised that adenoids may occur as early as the first year of life, that they seldom develop after the eighth year, and in the majority of cases are already established by the fifth year. The investigation as hitherto conducted has suffered from the disadvantage that the great majority of the children when first examined had already passed the age of onset; there were thus only a small number in whom it was possible to watch the early development of the condition. Moreover, with these children it has been necessary to rely upon the uncertain memory of parents for information of the highest importance concerning the diet, habits, and ailments of the children. For the proper study of the antecedent signs and symptoms it would be necessary to recommence at an earlier age—in fact to follow up a series of children from birth. Such an investigation would most easily be conducted at infant welfare centres, where the child's history could be recorded from month to month; only by such means can it be hoped to obtain reliable information as to feeding, ailments, habits, environment, and dental condition. In any such future inquiry it should be realised from the outset that enlarged tonsils may exist independently of adenoids (some of these cases showing little or no special tendency to develop adenoids) and equally that adenoids may occur unassociated with tonsils. Dissimilar causes may therefore be responsible for the two conditions.

Relationship to Dental Disease.

A definite relationship appears in the light of the Committee's investigation to exist between dental disease and the presence of enlarged tonsils and adenoids, but the nature of this relationship has not so far been established. It is conceivable either that the presence of septic teeth is a factor in the production of tonsils and adenoids, or that the mouth-breathing of adenoids predisposes to dental decay, or that both conditions have a common origin. Some light would be thrown on this question by the careful observation (*a*) of the effect of complete dental treatment on the tonsils and adenoids, and (*b*) of the effect on the dental

condition of removing the tonsils or adenoids. The Committee suggest that both these investigations could be carried out by school medical officers and school dentists without any greater difficulty than is involved in careful observation and recording. A delay of a few months before operating in order to test the value of dental treatment might possibly lead to important results.

Spontaneous Cure or Operation?

The after-history of the cases under review shows a tendency to spontaneous cure of a limited number, and that the cure, when it takes place, may provide as favourable a change in the general condition as is effected by operation. Nevertheless, in the experience of the Committee, the great majority persist unchanged for a considerable period, if indeed they do not get worse. Educational retardation is a fairly common result of adenoids, especially in the higher age-groups. The cause in a certain number of cases is the defective hearing which so often accompanies this condition; in others there is a certain mental lethargy which may be due to some interference with the cerebral circulation. Whether intelligence as measured by the usual tests is actually lower than normal does not seem to have been determined. This is a point worth investigating, particularly by a series of such tests to ascertain whether any improvement in the intelligence quotient results from the removal of the adenoids.

The immediate results of operation are shown to be favourable in the great majority of cases, but less so in regard to aural symptoms than to those of the nasopharynx. There is a small amount of evidence which suggests that the improvement in some children is not maintained. The Committee consider that some further inquiry should be pursued to determine whether this is in fact the case, and if so what are the probable causes. The question of recrudescence of adenoids after operation has not come within the scope of this investigation.

Two Further Investigations.

The Committee's report closes with an announcement of their decision to proceed with further investigations on the following lines: (1) The systematic examination of a series of unselected children from birth, in order to ascertain the facts in the early history and condition of these children which are associated with the onset of enlarged tonsils and adenoids. The examinations will include detailed inquiry into the maternal history during pregnancy and the dietary of the child during its early life, as well as a careful record of the dental condition, including the period of eruption, structure and arrangement of the teeth, the occurrence of caries, and the condition as regards oral sepsis. Any signs suggestive of rickets will be carefully noted. (2) The examination of a large number of unselected children at 5 years of age in order to ascertain the frequency of association of certain bony abnormalities suggestive of vitamin deficiency, with enlarged tonsils and adenoids.

MEDICINE AND THE LAW.

Certification Without Attendance.

AT an inquest at Walthamstow a fortnight ago upon a boy, aged 10, who had died from diphtheria, it appeared that a woman doctor had, on statements from the boy's mother and without personally seeing the boy, certified that he was suffering from influenza and unable to attend school. Questioned by the coroner, the doctor stated that she had not done such a thing in any other case, and did so here only because the mother was in such difficulties. It further appeared that the doctor had, again on the mother's statements and without seeing the boy, prescribed a tonic for him. In the course of recording a verdict in accordance with the medical evidence, the coroner remarked on the procedure by which anyone could seemingly go to a doctor and obtain an indefinite medicine called a tonic without the actual patient being seen; the consequence was, he said, in this particular case, that the mother assumed that the doctor had undertaken the treatment of the child; the child had remained at home seriously ill and a source of infection, and had gradually become worse and died.

Comments by coroners upon doctors obtain such prominence and publicity that it may sometimes be necessary to remember that the doctor has not always either received notice of impending criticisms or been allowed an adequate opportunity of reply: occasionally, too, the matter which gives rise to the comments is something rather remote from the actual cause of death which the inquest is investigating. Subject, however, to these cautious reservations, the incident would seem to invite attention to the necessity of strict care in the giving of certificates. The General Medical Council's "Warning Notice," it will be recalled, observes that any registered medical practitioner shown to have signed a certificate which is "untrue, misleading, or improper," is liable to have his name erased from the Medical Register. A certificate to excuse a child's absence from school is not one of the most important of documents, and agitated parents may by their importunity harass busy practitioners; but the whole profession suffers when a coroner has an opportunity to find fault as at Walthamstow. The wide powers of certification which the profession is allowed cannot be defended if carelessly applied.

Neurasthenia and Workmen's Compensation.

The legal relation of neurasthenia to personal injury is one of the most awkward questions for a judge, especially when he cannot transfer to a jury the task of assessing the financial consequences. In a recent Bristol case the county court judge made it clear that he had been guided largely by the opinion of his medical assessor. The applicant, a married woman, aged 63, with four children, had for a long time been in a position as domestic servant. One day she fell from some steps, the physical damage being slight but the mental result considerable. For some two months she received compensation at the rate of 15*s.* 9*d.* a week; then a medical certificate was given to the effect that the incapacity had ceased to be due to the fall from the steps and was now attributable to the recurrence of a previous nervous breakdown. The applicant claimed her condition was due to the accident; witnesses gave evidence that she had always suffered with her nerves but had not actually had a nervous breakdown before; it was said that she was worse since the accident, and had naturally worried herself over the termination of her award. A medical witness for the applicant said that, although work might take her mind off her worries, she was not fit to do work involving mental concentration. For the employer it was said, on the other hand, that the woman's state was a distinct type of neurasthenia not caused by her fall from the steps. The judge held that her condition was the result of the accident but that she was not wholly incapacitated. He estimated her to be capable of doing at least two half-days' work a week (with an earning value of 5*s.*), and awarded compensation (with costs) on the basis of such partial incapacity. These, of course, are cases in which there is more fact than law to decide, but they are none the easier on that account.

KING'S COLLEGE HOSPITAL.—On Thursday in last week Princess Marie Louise, acting for the Duchess of York, opened the Wigram Ward for children at this hospital, and received purses for the endowment of one of its cots, named after Princess Elizabeth. Sir Lenthal Cheatle, chairman of the Medical Board, stated that this is the first time that a ward has been founded devoted entirely to children needing surgical treatment. The ward contains 24 beds, all of which are full. Nearly one-half of them are given up to throat cases, which will obviate sending patients home immediately after operation on the tonsils. The ward formerly available for children will now be used for medical cases only.

HOSPITALS AND THE RATES.

PRESENT POSITION OF PROVINCIAL VOLUNTARY HOSPITALS.

A MEMORANDUM [1] issued by the Central Bureau of Hospital Information owes its origin to inquiries from the chairmen and secretaries of hospitals regarding the position generally with reference to assessments now being made under the Rating and Valuation Act, 1925, and the prospect of any action of a joint character being taken. A questionaire was sent out on Nov. 28th, 1928, to 679 provincial hospitals in England and Wales. By Dec. 31st replies were received from 221 hospitals, containing 18,339 beds (45 per cent. of the total). In a large number of places the figures of the revised assessment have not yet been determined and many hospitals hesitate to express a decided opinion with regard to joint action until they know exactly what their own position might be.

The summarised replies provide a basis large enough to justify an attempt to form estimates regarding the 40,285 beds in the English and Welsh provincial hospitals. These are: (1) That the English and Welsh provincial hospitals prior to revision were assessed at £63,000, or £1·56 per patient bed. (2) That the revised assessments of these hospitals under the Act of 1925 will amount to £95,000, or £2·36 per patient bed. (3) That these hospitals which, prior to revision, paid £44,000 annually in rates will, after revision, be called upon to pay £66,000. (In a statement issued by the Ministry of Health it is estimated that the average amount of local rates levied for the year 1927–28 was 13*s.* 8¼*d.* in the £ of assessable value.)

The views of the 221 hospitals regarding joint action are set forth in the following summary:—

	Number reviewed.	
	Hospitals.	Beds for patients and percentage of total.
Hospitals in favour of joint action with a view to obtaining de-rating ..	107	9,567 (52·17)
Hospitals in favour of joint action with a view to obtaining assessment on a preferential and uniform basis	60	4,623 (25·17)
Hospitals which did not express any opinion on the subject	51	3,947 (21·52)
Hospitals which definitely oppose joint action ..	3	202 (1·10)
	221	18,339

The financial effect of de-rating would be to relieve the provincial voluntary hospitals of an annual payment of approximately £66,000. With regard to the financial effect of assessment upon a preferential and uniform basis, an examination of the tables suggests that if the hospitals therein detailed can be considered as a representative portion of the whole, bases of 5*s.*, 10*s.*, and £1 per patient bed would increase the rates payable as follows:—

Amount of assessment per patient bed.	Percentage of hospitals where an increased amount would be payable for rates.	Percentage of total number of beds in the provincial voluntary hospitals.
5*s.*	6	4
10*s.*	13	8
£1	19	12

The memorandum is signed by Mr. R. H. P. Orde (director) and Mr. F. C. Davies (secretary), who conclude with the remark that the available data hardly justify further deduction than they have made.

[1] Memorandum No. 6, obtainable from the Secretary of the Bureau, 19, Berkeley-street, London, W.1. Single copies, 4d. post free. 12 copies, 2*s.* 6*d.*

BERLIN.

(FROM OUR OWN CORRESPONDENT.)

Influenza in Berlin.

THE pandemic of influenza which has now reached Berlin is apparently of a benign character, although lately more cases complicated with pneumonia have been reported. The epidemic began as early as December, 1928, but in the first few days of this year there was an explosive increase. On Jan. 4th, 1409 cases were notified to the Berlin general sick-club, which has about 500,000 members. There was at first some difficulty in finding room for the patients, as the hospitals were soon overcrowded, but the Municipal Health Office took the necessary measures. They lent from the Red Cross department 13 barracks with 200 beds, and 46 transportable huts held in reserve for special emergencies were taken into use; the new St. Joseph Hospital belonging to the Roman Catholic Order of the Grey Sisters, which was not to have been opened for several weeks, was made ready by working day and night, and its 600 beds were soon occupied. Some schools where a great number of pupils were ill had to be closed, and the school-rooms adapted as temporary hospitals. A drawback was that a large number of the nursing staff had caught the disease, so that a deficiency of nurses arose. The Health Office has appealed to retired nurses and voluntary Red Cross sisters to do temporary service in the hospitals, and the staff has been replenished in this way. The daily average number of new cases has not increased for some days, but remains at the same level. Children seem to be more liable to catch the disease this year than in former epidemics.

Foreign Guests of the Berlin Medical Society.

Two foreign guests, Prof. Claude Regaud from Paris and Dr. R. G. Canti from London, read papers before the Berlin Medical Society on the cancer question. Prof. Regaud gave in excellent German a report of the success obtained by radium treatment. He explained the different methods of radium administration, especially the method where needles impregnated with radio-active substance are placed round or into a malignant growth and left there for six to eight days. In cancer of the skin he attaches the radio-active tubes by means of a plastic wax mask, adapted to the respective part of the body. These masks are borne by the patients for some days without doing any harm. The results are excellent. In Prof. Regaud's hands 80 out of 344 patients with cancer of the tongue—i.e., 23 per cent.—were definitely cured; in 20 per cent. recurrence took place in neighbouring glands, and in 20 per cent. the treatment was ineffective. In cancer of the lips the results were still more favourable, as a cure was obtained in 90 per cent. of operable cases, whilst of 28 inoperable cases four were restored to health. In cancer of the cervix uteri the number of cures has increased from year to year. Dr. R. G. Canti, of St. Bartholomew's Hospital, London, showed his cinematographic demonstration of living cells, normal and malignant, cultivated in vitro, and of the action of radium on their growth. After the meeting the guests were entertained at a banquet which was attended by many members of the society and of the German Cancer Committee, and by representatives of the Health Office.

Gymnastics for School-children.

Dr. Schlesinger recently described to the Frankfort Medical Society researches on the influence of gymnastics on the physiological functions of school-children. 300 boys and girls from 10–17 years of age were examined before and after a gymnastic lesson. It was stated that in one-quarter of the boys and in one-sixth of the girls a marked increase of the dynamometric index was obtained, a proof that the mental rest had been stronger than the bodily

exertion; on the other hand, in one-third of the boys and in two-fifths of the girls the dynamometer showed a decrease of strength, which was especially noticeable in the weaker children, in fat children, and in those with anomalies of the cardiac function. After a long run, blood pressure was increased for about three minutes, but in the succeeding 15 minutes the pressure dropped to below the normal value. Forty per cent. of the children show a decrease of temperature in the axilla. Researches were further carried out in 250 school-children especially devoted to sport, in comparison with others who did only the prescribed gymnastic exercises or took no bodily exercise at all. It was ascertained that the size was but little influenced, but that the weight was increased by the stimulation of metabolism, and so were the spirometric and dynamometric index respectively. The examination of boys of 16–18 years of age who had gone through a short intensive course of training showed that the majority had an increase of weight and of hæmoglobin content of the blood, but a decrease of the spirometric and dynamometric index produced by latent fatigue due to over-exertion. Over-exertion of the heart was observed only when exercises had been performed without supervision.

Complaints by Dermatologists.

The dermatological and venereal section of the Berlin Medical Union recently held a meeting where the unfortunate situation of that branch of medicine was discussed. Although gonorrhœa had decreased by about one-third and syphilis by about two-thirds, the number of specialists for venereal diseases had increased by a quarter. It was stated that the recent law on the prevention of venereal diseases (mentioned in several of my former letters) had done harm to the profession in Berlin. Among other facts it was complained that if a specialist notifies under the law that a patient has interrupted treatment without being cured, the patient is summoned before the municipal health authority, and often sent back not to his medical attendant, but to one of the municipal dispensaries. This procedure is quite contrary to the agreement made between the city authorities and the union. It was moved that these abuses should at once be abolished, and that a fee for the notification of venereal diseases should be paid, as is legally provided for trades diseases.

Withdrawal of Medical Qualification.

It is very difficult in Germany to remove a medical qualification from a doctor proved unworthy to hold it. This can be done only if the qualification had been obtained by fraud, or when a medical man had been punished by a law court for a crime with the loss of civil rights, and then only as long as the punishment lasts. The government intend to alter this state of things, and have asked the opinion of the medical chambers on that subject. They propose that the qualification may be withdrawn if a medical man has proved not to possess the reliability necessary in his profession, but that the government shall be authorised to restore the qualification at its discretion. This provision has, however, not met with the approval of the chamber because it is too elastic. They are advising the Government to provide that the withdrawal of a qualification may be made legal if a medical man has been found guilty of severe criminal or moral offences, or if owing to a mental disease he is unable to practice. This, however, is to be done only if the supreme court of honour agrees, and the qualification may be re-granted only with the consent of that court. The matter is still in a preliminary stage and will not yet come before Parliament.

Special Motor Badge for Medical Men.

The German Motor Car Club (Adac) have resolved to introduce a special badge for the cars of their medical members. This badge will be a round plate with a red cross on blue ground and the arms of the Adac. The badge obliges the proprietor of the car to give first aid in accidents, to inform the next ambulance station, or to convey the injured to the next hospital if necessary. He is further obliged to carry with him an adequate supply of medicaments for first aid and material for dressings. The badge, which is to be placed at the front of the car, will be given by the club to every member accepting the above conditions.

The Services.

ROYAL NAVAL VOLUNTEER RESERVE.

Surg. Sub.-Lt. F. T. Doleman to be Surg. Lt.

Proby. Surg. Sub.-Lts. J. D. J. Freeman, J. A. White, G. O. Barber, R. P. Davies, D. G. Evans, E. G. Thomas, and D. A. Williams to be Surg. Sub.-Lts.

Surg.-Lt. E. E. D. Gray to be Surg. Lieut.-Comdr.

ROYAL ARMY MEDICAL CORPS.

Capt. G. E. L. Simons to be Maj.

Temp. Lt. R. H. Dunlop relinquishes his commn.

F. H. A. L. Davidson to be temp. Lt.

REGULAR ARMY RESERVE OF OFFICERS.

Col. E. T. F. Birrell, late R.A.M.C., having attained the age limit of liability to recall, ceases to belong to the Res. of Off.

TERRITORIAL ARMY.

Maj. W. A. Robertson to be Lt.-Col. and to comd. the 152nd (Highland) Fd. Amb.

H. G. Garland to be Lt.

ROYAL AIR FORCE.

The undermentioned are granted temporary commissions as Flight Lts. on re-employment: E. E. Isaac and G. S. Ware (Hon. Squadron Leader).

Flying Officer A. L. St. A. McClosky is promoted to the rank of Flight Lt.

Capt. W. Wormington (Army Dental Corps) is granted a temporary commission as a Flight Lt. (Dental) on attachment to the R.A.F.

Flight Lt. W. R. Wotton (Capt. Army Dental Corps) relinquishes his temporary commission on return to Army duty.

DEATHS IN THE SERVICES.

Deputy Inspector-General Isaac Henry Anderson, R.N., who died at Twyford, Winchester, on Feb. 2nd, aged 80, graduated M.D. at Queen's College, Belfast, in 1871, in which year he entered the Royal Navy as surgeon. Appointed to the *Salamis*, he served during the Egyptian War of 1882, and for his services received the Egyptian medal and the Khedive's bronze star. He also served during the naval and military operations near Suakin in 1884, when he was awarded the Suakin clasp. After being promoted staff surgeon in 1883 and fleet surgeon in 1892 he had charge of the naval hospital at Simons Town at the Cape of Good Hope, and received their lordships' approval for services rendered at the hospital during the fever which occurred after the Benin Expedition. Later he served at Portsmouth, and retired in 1902. He was in receipt of a Greenwich Hospital pension for good services on the active list.

NAVY MEDICAL OFFICERS.

A Fleet Order calls the attention of medical and dental officers to the regulations governing private professional practice. It is provided that if a plate is displayed it is to show the officer's rank in the Navy, and must bear upon it the words "Royal Navy." No hours of attendance are to be shown on the plate. No civilian appointment, such as on the staff of a civil hospital, is to be accepted without approval from the Admiralty.

COLONIAL MEDICAL SERVICES.

C. J. Wilson, Deputy Director of Medical Services, Kenya, has been promoted to be Principal Medical Officer, Federated Malay States.

The following appointments have been made:—W. Worger, Medical Officer, Fiji; C. E. Vaz, Medical Officer, Public Hospital, Jamaica; G. D. Drury, Medical Officer, Kenya; J. A. L. Innes, Medical Officer, West African Medical Staff, Nigeria, Southern Provinces; R. A. Newsom, Medical Officer, Northern Rhodesia; R. H. Kipping, Medical Officer, Somaliland; L. F. Day, Medical Officer, Straits Settlements; A. McK. Fleming and I. C. Middleton, Medical Officers, Tanganyika Territory; R. Stuart, Medical Officer of Health, West African Medical Staff (Colony not allocated); R. Nicklin, Medical Officer, Zanzibar.

Correspondence.

"Audi alteram partem."

TREATMENT OF INFLUENZA.

THE PREVAILING EPIDEMIC IN LONDON.

To the Editor of THE LANCET.

SIR,—That the present epidemic of influenza will far excel in severity the visitations of recent years is already only too obvious. Grave complications manifest themselves in the early stages of the disease, and may lead to death after an illness of three or four days only. Powerless as we are to stem the tide now spreading throughout the population, yet certain therapeutic measures, directed towards prevention or cure of the complications, appear to be of definite value, and of these I write.

Symptoms and Signs.—The outstanding symptoms of a hundred cases observed during the last few weeks were aching of the limbs, frontal headache, hard cough, sore-throat, and pain in the chest. The latter is limited to a small area of the chest wall, and, although occasionally aggravated by inspiration, usually is unaffected by respiratory movements. Tenderness in the position of the pain is commonly found together with limited movement of the chest on the affected side. Auscultatory signs are wanting, and in the majority of cases the pain disappears in 48 hours. Presumably a localised pleurisy is the cause of the symptom. The temperature is found to be raised to about 102° F. in the afternoon, and falls to 99° F. in the morning. The pulse-rate is raised proportionately. In cases which have subsequently developed complications, however, the pyrexia has been of sustained nature at the outset, varying between 103° and 104°. In such patients, on the third or fourth day of the illness, the temperature and pulse have fallen during 24 hours, the change being associated with a feeling of improvement on the part of the patient. On the following day, however, both temperature and pulse have again risen to the former high level, at the same time rapidly developing signs of pneumonia have been observed. Leucocytosis is often absent, and rarely exceeds 12,000. The fauces and palate are diffusely congested, but pus is seldom to be found on the tonsils. In about 5 per cent. of cases there is tender enlargement of the glands lying along the borders of the sterno-mastoid muscles.

Complications.—The cases presenting from the onset a temperature of 104° F. with trivial daily fluctuations are those most prone to develop complications about the fourth day of the disease. These have been: acute otitis media, acute empyema of antrum, lobar pneumonia, and septicæmia with no signs of localised inflammation. The striking characteristic of all these affections is their extreme rapidity of development. A slightly reddened tympanic membrane may change to one bulged by pus in the course of a few hours. In spite of early drainage acute mastoiditis follows only too frequently. Similarly, one or more lobes of the lungs may become solid in the course of a few hours and a pleural cavity half fill with pus in a day. In this year's epidemic the pneumonic signs are almost always those of lobar distribution, in fact the signs and type of pyrexia resemble exactly those found in pneumococcal pneumonia, save that there is rarely a crisis. Nevertheless, in all the complications mentioned the preponderating organism is a hæmolytic long streptococcus. It is this fact which suggests the line of treatment to be followed.

Treatment.—In the first place, as soon as symptoms have appeared, the patient must be put to bed, given a brisk purge, and placed on a diet of fresh fruit—e.g., grape fruit and oranges and copious drinks of lemon squash, Contrexéville water, and not more than half a pint of milk daily. In uncomplicated cases, virtual starvation in this manner, good nursing, and sufficient sleep, which must be procured, are all that is necessary. If, however, the temperature is unusually high, the symptoms of exceptional severity and prostration marked, the case must be suspected as likely to develop grave signs. In all such intravenous administration of antistreptococcic serum should be practised. The dose to employ is 40 c.cm. daily for two or three days. It is quite remarkable to observe the sudden fall of temperature and subsidence of symptoms which often closely follows this measure. On the day following the first injection the temperature may be normal, but if no further serum be given, it often rises to 100° F. the next day, but this feature is of transient duration. Three of many cases thus treated had, in addition to the usual severe headache, high temperature and rapid pulse, respiratory rates of over 30 with pleuritic pain and grunting respiration, all of which developed in 36 hours. Within 12 hours of the injection of serum they were free from all symptoms save that of extreme lassitude.

Once pneumonia is definitely established serum appears to have but little effect. On the other hand, mercurochrome should be given a trial in these cases. I have seen recovery follow its use in apparently desperate cases of pneumonia and streptococcal septicæmia. The amelioration is shown after the first or second dose by the onset of lysis, fall of pulse-rate, and improvement in general condition. That recovery might have occurred in any case is, of course, the obvious and unanswerable comment. I can only reiterate that the use of the drug was apparently the means of averting death. Even if the evidence be slender from a scientific standpoint, yet when our patients are in peril such treatment, if not in itself a danger, should not be withheld. Of five streptococcal lobar pneumonias recently observed, four treated with mercurochrome recovered, the fifth treated on purely orthodox lines died. This may be pure coincidence. The preparation should be given intravenously as a 0·5 per cent. solution in doses of 10 to 15 c.cm. daily for three days. It is essential that the injection be made slowly. Larger doses are not to be recommended, and may produce severe griping. Empyemata should be aspirated repeatedly, and not subjected to open operation.

The *after-treatment* of influenza and its pulmonary complications is of the greatest importance. Palpitation and unstable pulse-rate are common sequelæ and referable to the effect of the toxin on the myocardium. These signs indicate further rest in bed, together with carefully graduated limb exercises supervised by a masseuse trained in the treatment of cardiac disease. If these exercises are skilfully prescribed the pulse shows progressive improvement in stability and rate, until the stage is reached when the patient can safely leave his bed. Kneading of the limb muscles is also of value in preparing the subject for convalescence, for it obviates much of the profound weakness which has characterised every influenzal epidemic of this century. Post-pneumonic cases should be given respiratory exercises, and these must be persisted in until equal movement of the two sides of the chest has been attained.

Finally, all but the mildest cases must be sent into the country for at least three weeks. During this time strychnine will be found of great value as a tonic, particularly in view of the low blood pressure which follows influenza and which will persist if convalescence is not properly supervised.

I am, Sir, yours faithfully,

A. H. DOUTHWAITE, M.D., M.R.C.P.,
Feb. 11th, 1929. Assistant Physician, Guy's Hospital.

NUCLEIN IN PNEUMONIA.

To the Editor of THE LANCET.

SIR,—Now that the scourge of influenza is again raging in Europe and America, and the death-rate from pneumonia is consequently increasing, may I, once more,[1] call attention to the method of

[1] See F. M. Gardner-Medwin: Brit. Med. Jour., 1924, ii., 49; and J. G. Willmore and F. M. Gardner-Medwin: THE LANCET, 1922, i., 116.

precipitating the crisis in pneumonia by means of intra-muscular injection of sodium nucleinate together with neutralisation of the subacidosis due to febrile toxæmia. A series of 40 consecutive cases was quoted of fulminating pneumonia so treated, in which the crisis was brought about in 48 hours or so with consequent defervescence and recovery, mostly occurring during the pandemic 1918. Since then my series has been uninterrupted so far as cases of lobar pneumonia, in previously healthy persons without crippling complications, is concerned. I do not claim that it is always successful in the ancient and infirm, or in advanced nephritics, or in the terminal pneumonias of long-standing disease, but I do claim that it is practically always successful in cases of straight pneumonia occurring as the result of the sudden lowering of resistance by influenza or sudden chill, and that these cases can be saved the debilitating strain of the long wait for the normal crisis which so often kills them.

Let me, then, formulate my credo: In influenza, leucopenia diminishes resistance. Saprophytic organisms become pathogenic. Sodium nucleinate releases leucocytes, latent in the bone-marrow, into the blood stream, increasing phagocytosis.

I believe that in nearly all cases of uncomplicated pneumonia, if sufficient bicarbonate of soda and glucose is given to render the urine alkaline or neutral, and 2 c.cm. of the solution of sodium nucleinate (put up by the Clin Laboratories of Paris) is injected intramuscularly into the thigh, in 48 hours or so the temperature will fall to normal, and convalescence will begin forthwith, and the patient will rapidly recover. I am not alone in my optimism, for Dr. L. E. Miller, of Lichtenburg, Transvaal, after using this method [2] on 117 natives, 87 of whom had lobar pneumonia, records a death-rate of only 8 per cent. He adds: "This treatment . . . is of definite assistance in terminating lobar pneumonia quickly and successfully."

I sincerely hope that practitioners who have used this treatment will give me the benefit of their opinion, and their results.

I am, Sir, yours faithfully,
F. M. GARDNER-MEDWIN.

St. Asaph, North Wales, Feb. 10th, 1929.

ASTHMA RESEARCH.

To the Editor of THE LANCET.

SIR,—My friend, Dr. Culpin, being, as he is, not merely a psychotherapist but a clinician of wide experience, has no need of aid in the present discussion. But I would like to suggest that some individuals who display the biochemical reactions upon which Mr. Coke and others lay such stress, in association with asthma, in the presence of cats, may well be thereby expressing a repressed or forgotten horror of cats due to some terrifying infantile experience. As a matter of fact, as some of us know, this is apparently the case often enough. And the most economical method of effecting a cure is to revive and explain the forgotten experience: not to carry through desensitisation in the absence of psychological investigation. On the other hand, those who have a lively horror of cats, present ever to their minds, and who do not hesitate to express what they feel, do not seem to suffer asthma and to display the biochemical reactions in question, even though, as sometimes happens, they have forgotten the early experiences in association with cats that have so impressed their organisations.

It seems relevant to point out that, at two recent medical meetings, papers were read on Vertigo (R.S.M., Section of Otology) and Exophthalmic Goitre (Manchester Medical Society). Mutatis mutandis, all that Dr. Culpin has said about asthma is applicable to these two maladies. Yet I have failed to find, in reports of these meetings, the faintest indication of awareness that psychotherapy does afford rapid and lasting relief to many persons suffering from vertigo or exophthalmic goitre; without surgical treatment, or even in spite of it.

Surely some quickening of knowledge in respect of what I may call clinical psychotherapy is badly needed, and without delay. But, as I was recently asked, at a meeting of general practitioners, how is the general practitioner to learn? We have, first, to settle the problem of who is to teach the teachers—to say nothing about the researchers.

I am, Sir, yours faithfully,
Wimpole-street, W., Feb. 9th. F. G. CROOKSHANK.

To the Editor of THE LANCET.

SIR,—Mr. Coke evidently confounds psychotherapy with psychoanalysis. His emotional reaction to the latter is quite understandable, but there exists no necessity to have recourse to mysticism or pseudo-scientific theory. Pavlov's work, which is scientific work of the highest order, helps us to understand and explain most, if not all, cases of "psychogenic asthma," and there is no longer any doubt about its existence. I should like to refer Mr. Coke to the correspondence on this subject in your columns two years ago.[1]

I am, Sir, yours faithfully,
Shortlands, Kent, Feb. 9th, 1929. A. WOHLGEMUTH.

To the Editor of THE LANCET.

SIR,—Dr. Culpin and Dr. Ross have paraphrased sentences out of my letter at great length, in an attempt to produce a reductio-ad-absurdum argument to my contentions that nervous manifestations carry a stigma, especially when wrongly applied to asthmatics.

So far from being convinced by them, I hold that anything short of perfection in health, strength, and beauty carries with it a proportionate stigma, or mark of inferiority. If two women are sitting on a bench, the one with a fine healthy child, the other with a weakling, the mother with the latter child will "feel a bit green," to describe the complex in the vernacular. The small boy puts off going to the sick-house as long as is possible, because to do so is to drop behind a standard of perfection, probably in his case some beefy boy who is captain of the football team. If the young bride has the "misfortune" to be so "unlucky" as to marry a "poor fellow," whose "unhappy" lot it is is to "lapse" into a state of neurasthenia, who is there amongst her friends who will not "commiserate" with her in the family's "sad affliction"? The man of 60 boasts of his two rounds a day in the presence of the man who can only accomplish 18 holes. The old buffer, who can still stand up, chaffs his friend tucked up in a bath-chair.

But, to take the battle into the enemy's country, a patient was sent to me suffering from irritability, fits of temper, and some suggestion of developing grandiose ideas; these made it difficult for him to maintain a very substantial business position, or to live happily at home. Carrying out full protein tests, I found that he gave a large reaction to potatoes. His temper and general equanimity returned to the normal on carefully avoiding that article of food. The work of W. R. Shannon in America demonstrates the connexion between the fractious, cantankerous child, with his bursts of temper, and sensitisation to foods. Lastly, I should be extremely interested to know whether people, who have this cat phobia, are indeed sensitive to cats, as demonstrable by the dermal reactions. Is it the sense of smell or sight that starts the alarm? Are they aware of the cat's presence, which to others is unsuspected?—conversely would they exhibit these fears if told a cat were present, when such was not really the case?

When one has seen such purely mechanical nerve action to take place as the paralysis of the accommodation of the eye following the eating of an apple, or the development of a patch of herpes facialis following the ingestion of a piece of cheese, or an

[2] South African Med. Rec., 1926, xxiv., 531.

[1] THE LANCET, 1927, i., 962, 1323, ii., 88.

attack of asthma from the unsuspected presence of a guinea-pig in the room, it is difficult to say how many lesser strings may not be played on by biochemical or mechanistic means.

Where Dr. Ross gets his idea that I start by disbelieving my patients, or that I am lacking in charity, I do not know. The palmists tell me that my thumb turns outwards to an astonishing degree.

I am, Sir, yours faithfully,

Feb. 11th, 1928. FRANK COKE.

THE EGYPTIAN CONGRESS OF MEDICINE.

To the Editor of THE LANCET.

SIR,—It may appear ungracious to comment on the very generous appreciation of our recent Centenary Congress in Cairo which appears in your issue of Jan. 12th (p. 101), but I would like to be allowed to correct a few inaccuracies which have unconsciously crept into your correspondent's account of the proceedings.

First, it is only right that a tribute should be paid to the extraordinary keen and personal interest taken in the Congress by H.M. King Fuad, whose example served as a powerful stimulus to us all. His Majesty was graciously pleased to receive at the hands of the Chancellor, who is also the Minister of Education, H.E. Ahmed Bey Lotfy El-Sayid, the first honorary degree (Doctor of Laws) conferred by the Egyptian University. His name will also be ever associated with the new hospital. The formula adopted at the ceremony of the laying of the foundation-stone was:—

"This foundation-stone of the new buildings of Kasr-El-Ainy School of Medicine and the King Fuad I. Hospital, which form the Faculty of Medicine in the Egyptian University, was laid by His Majesty on Dec. 16th, 1928, in the eleventh year of his reign."

thus perpetuating the name of Kasr-El-Ainy and incorporating that of King Fuad at the same time. The new school is planned to provide for 600 students, and the hospital will eventually contain 1500 beds—not 700 as stated—and allow of 3000 out-patient attendances a day. In the year that is just past Kasr-El-Ainy gave relief to 18,000 in-patients and totalled 510,000 out-patient attendances, an increase of 12,000 over those for 1927.

Stress might also be laid on the extraordinary interest and enthusiasm caused by the conferring of the Honorary Fellowship of the Royal College of Surgeons on Aly Bey Ibrahim. This was a very picturesque ceremony, distinguished by a brief but impressive address by Sir Berkeley Moynihan, the President of the College. The memorising by the students of some such striking phrase as "this is the highest honour the College has in its power to bestow" was clear evidence of the impression created by this remarkable compliment extended to the Faculty of Medicine of Cairo by the Council of the Royal College. The presentation of addresses and the reception of delegates from all corners of the globe appealed very strongly to the staff and students of the Faculty, who were delighted to see so many leaders of the profession who hitherto had been only names to them.

With such a cosmopolitan gathering the selection of recipients for honorary degrees was exceedingly difficult, and the following 20—not 13—were honoured by the M.D. Degree at the final meeting of the Congress:—

Germany: Prof. Fülleborn, Hamburg; Prof. Kleine, Berlin.
Belgium: Prof. Henri Frédéricq, Liége.
United States of America: Prof. Bailey Ashford, Porto Rico.
France: Prof. Lépine, Lyon; Prof. Brumpt, Paris; Prof. Delmas, Montpellier; Prof. Vaquez, Paris.
Great Britain: Sir Berkeley Moynihan (M.S.), Sir Holburt Waring (M.S.), Sir William Wheeler (M.S.), Sir Robert Philip, and Sir Cooper Perry (in absentia).
Greece: Prof. Aravantino, Athens.
Italy: Sir Aldo Castellani and Colonello Grixoni.
Japan: Prof. R. Kawamura.
Holland: Prof. Schuffner.
Prof. Euziere, Dean of the Faculty of Montpellier, Clot Bey's alma mater.

According to a precedent observed at all previous congresses held in Egypt, the names of the senior national delegates were submitted to His Majesty for honourable distinctions and were therefore not included in the list for honorary degrees, a circumstance which should be mentioned, to remove any misunderstanding on this score. The list of honours is being awaited with considerable interest.

Perhaps the most interesting incident in the course of the week was a meeting between H.E. Shaheen Pasha, Under Secretary of State for Public Health, and some of the principal British delegates at which a very frank and cordial conversation took place on public health questions in general, on the position of Egyptian students in England, and on the general medical relations between Egypt and England. All the delegates were unanimous in their appreciation of Shaheen Pasha's broad-minded views on all these matters and an excellent spirit of mutual satisfaction and conciliation prevailed.

Finally, a word of praise to Dr. M. Khalil, professor of parasitology, and secretary-general of the Congress, for his excellent work, would not be out of place. It was due to the cordial coöperation of the staff of the Faculty and the organisation committee that we were able to survive the strenuous labours entailed by a congress on such a comprehensive scale and to carry it through to a successful issue.—I am, Sir, yours faithfully,

FRANK C. MADDEN,
Dean of the Faculty of Medicine
Jan. 28th, 1929. Egyptian University.

*** We take the opportunity of adding that the Egyptian Government has issued two postage stamps to mark the importance of the occasion. The first (5 milliemes) depicts Imhotep, the Egyptian deity of

CENTENAIRE DE LA FACULTÉ DE MÉDECINE - LE CAIRE
10
MILLS
CONGRÈS INTERNATIONAL DE MÉDECINE - 1928
CENTENAIRE DE LA FACULTÉ DE MÉDECINE - LE CAIRE
5
MILLS
CONGRÈS INTERNATIONAL DE MÉDECINE - 1928

medicine, seated on his throne, grasping the sceptre of power in his right hand, and the "ankh" or symbol of life in his left. The second (10 milliemes) is a portrait of the Viceroy Mohamed Aly Pasha, to whom the foundation of the medical school of Cairo 100 year ago was due. Dr. Jamieson B. Hurry, who sent us the stamps, remarks that this is probably the first time in the history of medicine that one of its tutelary deities has appeared on a stamp.—ED. L.

INSULIN IN OILY SUSPENSION.

To the Editor of THE LANCET.

SIR,—More than a year ago I came to the conclusion that some cases of diabetes mellitus with the usual typical thirst, polyuria, and hyperglycæmia made a complete recovery provided they were treated with a fixed diet which supplied sufficient energy and tissue-repairing protein along with insulin

in doses which kept the concentration of the sugar in the blood below 0·15 per cent. throughout the 24 hours. In order to obtain this control of sugar in the blood some cases might require four or more injections of insulin during the 24 hours; this made the treatment very difficult. It occurred to me that it might be possible to prolong the action of an injection of insulin by delaying its absorption and thereby obtain the desired effect. I considered several possible methods, and in August of last year I asked a manufacturer of insulin to supply me with an oily suspension.

Since November last I have used this in private and at the London Hospital, and find that I can give 90 units as a single dose, which will control the sugar in the blood just as well as three aqueous doses of 30 units each at intervals of six hours. I have used an oil that is acceptable to some patients, whilst others complain of pain lasting some time after the injection. The ideal oil will not give rise to pain, but it must be capable of keeping in suspension at least 60 units of insulin per cubic centimetre if it is to be used in very severe cases. The optimum concentration of the injection will have to be determined for each case.

I shall feel indebted to any one who gives me a list of oils the hypodermic injection of which does not lead to discomfort.

I am, Sir, yours faithfully,

Portland-place, W., Feb. 11th, 1929. O. LEYTON.

LOCAL ANÆSTHESIA IN UPPER ABDOMINAL SURGERY.

To the Editor of THE LANCET.

SIR,—A large experience of novocaine in spinal analgesia, resulting from the routine use of it in the practice of two general hospitals, prompts me to add a few observations to the very instructive paper by Prof. Pannett in your last issue.

First, I suggest that dosage should always be indicated by the number of centigrammes of solid novocaine injected, for the actual percentage solution of the drug in the cerebro-spinal fluid is an unknown quantity, and the presence of ampoules of different percentage strength about an operating theatre is a trap for the unwary who think in cubic centimetres. The 10 per cent. solution in normal saline is certainly the most convenient to use, because each tenth of a cubic centimetre contains one centigramme. I believe that the extent of analgesia obtainable is directly proportional to the amount of drug injected, that its extension is mainly by diffusion, that gravity plays a small but unimportant part and is of little practical help. The higher the injection is made the greater the chance of high diffusion. I have so frequently injected between D. 12 and L. 1 without regret, that I cannot help thinking that the spinal cord is in little danger, provided that the needle is not plunged haphazard into the theca, but only so far as to obtain fluid. Between L. 1 and L. 2 I regard as safe.

The extent of the result must be estimated, and if deficient a second injection may be made to enhance it. On no account may the patient be questioned as to his sensation, for if this is done his confidence is lost. A small dose in the lower intervals will result in tingling in the legs, absence of sphincter reflex, loss of corrugation at the anal margin, and the operation for piles may be commenced. With increasing doses at higher levels inability to raise the legs proves that the lumbar segments are out of action, and paralysis of the lower rectus gives a characteristic appearance which is unmistakable (D. 9–12). If the upper segments of the muscle are unaffected, the umbilicus is drawn up when the patient coughs. At this level analgesia of the abdominal wall below the umbilicus may be relied upon, but splanchnic sensation may be felt when the appendix is delivered, often as windy or colicky pain in the epigastrium. Analgesia involving the nipples implies, as Prof. Pannett says, that the splanchnic communications are cut. Slight tingling in the upper limbs foretells that the surgeon is likely to make an easy exit from the abdomen if he does not much exceed one hour.

Nausea and vomiting are unfortunate accompaniments, but generally indicate high level results. The onset is from about 20 minutes after injection, and its duration corresponds to the period of lowest blood pressure. From its termination the condition of the patient may be expected to improve steadily towards the end of the operation, when the pulse may be satisfactory and there may be no post-operative shock. It is quite common for the pulse to become infrequent and as low as 40 per minute; it may also be impossible to feel it in the temporal artery. The dose may be up to 15 centigrammes, with from 10–12 as an average, but more than this has often been given in some of my cases when more than one injection has been given. The toxic effect of any quantity of novocaine likely to be used in this method is negligible, but this cannot be said of stovaine.

Progress in this method is, I believe, likely to be made by greater confidence in administration, more certain estimation of results, and a realisation that a second injection may be made to improve those which are imperfect. That this is the easiest and most certain way of obtaining splanchnic block, I have no doubt. That it will ever by itself become the method of choice for serious high operations I do not believe, unless the fall of blood pressure can with certainty be countered; for it may be a trial of fortitude for the most phlegmatic patient, and the more nervous he is the less welcome will it be. That it can be so used, if necessary, is certain. Its ordinary use for these cases is in combination with general anæsthesia, and tracheal insufflation offers the widest margin of safety. For minor abdominal work and low operations it has long been a commonplace success, though pneumonia sometimes follows its use. Doubt cast upon the efficacy of novocaine can only be explained by imperfect knowledge of dosage, which is at least double that of stovaine.

I am, Sir, yours faithfully,

W. HOWARD JONES, M.B., B.S. Lond.,
Surgeon-Anæsthetist to Charing Cross Hospital.

London, W., Feb. 12th, 1929.

THE TREATMENT OF HÆMORRHOIDS BY INJECTION.

To the Editor of THE LANCET.

SIR,—Dr. Whitcombe's last letter calls for a brief reply from me, if only to point out the peculiar method he has of giving references. He quotes a paragraph which he alleged that he took from "the text of the official report, which followed the proctological meeting at the Royal Society of Medicine on July 9th, 1924." Naturally, I assumed that he referred to the Proceedings of the Royal Society of Medicine. But when I turned to that volume I found not a word of Dr. Whitcombe's quotation, but a summary without comment of the various papers and speeches, which is almost identical with that published in THE LANCET (1924, ii., 117)—the reference given by Dr. Whitcombe in the letter in which he first attacked the treatment of hæmorrhoids by injection.

Having found that both his references were misleading, I was compelled to ask him personally whence he had quoted, and ascertained from him that his quotation was not really from "the official report" nor from THE LANCET, but from a report of the same meeting in the *British Medical Journal* of July 19th, 1924. In this number of your contemporary a verbatim report is given of the opening paper of the late Mr Græme Anderson, who up to the time of his lamented death was an advocate of the treatment by injection. On another page of the same number of the *Journal* is a very brief summary of the remaining speeches made at the meeting. This is written by somebody who obviously had a strong bias against the treatment, because, apart from referring to Mr.

Anderson's paper on another page, it quotes only speeches made by two American surgeons who were violently opposed to the treatment, and does not refer at all to those of the numerous British and American surgeons who spoke in favour of injection. In the middle of this short summary the words quoted by Dr. Whitcombe appear. But anybody who takes the trouble to read the summary of all the papers and speeches, either in the "official report" or in your own report of the meeting, will agree that the "general opinion" was certainly not that arrived at by the reporter in your contemporary and by Dr. Whitcombe.

Dr. Whitcombe accuses me of inconsistency, and inquires why I have changed my methods of injection. My reasons were fully set out in the paper of mine which you published.[1] and in the recently published reprint of my book on Hæmorrhoids. Briefly, they were in order to eliminate the few and rare complications which occurred with the older methods—complications which were not as numerous nor as serious as those mentioned by Dr. Whitcombe as occasionally occurring after treatment by galvano-cautery. I should still hesitate long before I injected an oily solution into the veins of the pile-mass. The *submucous* injection of an oily solution is quite another matter.

No doubt Dr. Whitcombe's results from treatment by galvano-cautery are satisfactory on the whole, but I am not convinced that his method is either as satisfactory or as safe as the treatment by submucous injection, and it is certainly more lengthy and troublesome both for the patient and the surgeon.

I am, Sir, yours faithfully,

ARTHUR S. MORLEY.

Upper Wimpole-street, W., Feb. 9th, 1929.

TONSILLECTOMY IN CHRONIC ARTHRITIS.

To the Editor of THE LANCET.

SIR,—Mr. Pavey-Smith's paper and the leading article in your issue of Jan. 26th bear out the opinion I have often expressed that tonsillar infection seldom bears any relation to chronic articular rheumatism. In 200 cases only out of a total of 7000 cases of rheumatic disease were the tonsils considered sufficiently infected to warrant enucleation. As 44 of these 200 were of the acute rheumatic type, these should be excluded as it is, I think, agreed that the ætiology of rheumatic fever and of so-called chronic rheumatism of joints is not the same. If we also take out fibrositis, neuritis, and sciatica we are left with some 120 cases, or less than 2 per cent. of the whole number. Of these, 15 reported themselves as cured and 65 as improved, which works out at just about 1 per cent.

The bacteriological findings are of considerable interest. These also confirm my own experience that the hæmolytic streptococci never have any direct causal connexion with arthritis. When present in the tonsil and causing actual tonsillitis, no doubt they lower the general resistance of the system, but non-hæmolytic streptococci are, on Mr. Pavey-Smith's showing, far the most important in chronic arthritis. If one compares these statistics with those of Howarth and Gloyne, who found that hæmolytic streptococci occurred in the ratio of 16 to 22 of non-hæmolytic, here is but little difference; not more than would be accounted for by the fact that the former are from children only in whom sore-throats are more common. From the adult tonsil, unless acute tonsillitis is actually in being, it is unusual to cultivate a hæmolytic streptococcus. That a white staphylococcus was found in pure culture in two tonsils in cases of rheumatoid arthritis (infective arthritis D. where no focus of infection was discovered) is in accordance with my hypothesis that a white staphylococcus infection (*M. deformans*) is the primary cause of rheumatoid arthritis.

To sum up, tonsillar infection is of outstanding importance in cases of acute and subacute rheumatism. It is of much less importance in all other forms of infective arthritis, and in cases of osteo-arthritis the tonsils as a focus of infection may be completely disregarded. Only one case occurs in Mr. Pavey-Smith's series.

I am, Sir, yours faithfully,

London, W., Jan. 30th, 1929. H. WARREN CROWE.

[1] THE LANCET, 1928, i., 543.

RADIUM TREATMENT OF CANCER IN FRANCE AND BELGIUM.

To the Editor of THE LANCET.

SIR,—In their article on this subject (THE LANCET, Feb. 9th) Mr. Armour and Mr. Souttar pay very gracefully a well-merited tribute to the great courtesy and kindness extended by the staffs of French and Belgian radium clinics to them as to many other visitors for years past. They do not mention, however, one particular in which the workers of Brussels and Paris have seemed to outshine some others. It is in their willingness not only to give, and give generously, of their experience, but in their equal readiness to learn and to avail themselves of suggestions put forward by their visitors. Notwithstanding the handsome words in the closing paragraph about workers at home, the article hardly seems to us to disclose familiarity with the stage radium work in this country has reached. For example, after reading the account of Columbia paste, an English surgeon would perhaps be surprised to hear that this wax, in convenient sheets of standardised thickness (15 mm.) and standardised melting point, can be purchased over the counter at a well-known chemist's in Oxford-street, or that the salesman will naturally say, "Do you want the lead, Sir?" referring to sheets of standard thickness beautifully rubber-covered.

There is no reason, of course, unless a visit were paid to home clinics, why the authors of the article should know this, or that the Brussels "shavings" method—which is difficult—is being substituted in London by the use of plastic wood.

We are, Sir, yours faithfully,

E. ROCK CARLING,
STANFORD CADE.

London, Feb. 10th, 1929.

MARVELLOUS MONTPELLIER MIDWIFERY.

To the Editor of THE LANCET.

SIR,—About eight months ago I published in your columns[1] a note under the above heading, in the hope that a little ridicule, culled from the old Montpellier doctor, Rabelais, would prevent your readers from attempting "the delivery of women by appointment at a fixed hour" introduced by the modern Montpellier doctor, Prof. Delmas. The latter's method consists in rapid manual dilatation of the cervix under the influence of spinal anæsthesia, followed by version or forceps, and is a revival of "accouchement forcé," with the additional risk of spinal anæsthesia.

Three French obstetricians appear to have taken Prof. Delmas *au sérieux* and have put his method to the test—not, indeed, to deliver ordinary cases "painlessly, by appointment, at a fixed hour," but for certain definite indications calling for artificial delivery. Their cases, 14 in number, should be read[2] by those who contemplate trying the method of Delmas. Of Mr. Laurier's eight cases, one died of post-partum hæmorrhage, seven had lacerations of the cervix, and three had slight tears of the perineum. Three children were dead before the operation. Mr. Laurier calls attention to the facility with which the cervix can be dilated in certain cases—in some it was incomplete—but "does not think the method a safe one to be placed in all hands and without formal indications." The results, above mentioned, seem to call for a stronger condemnation.

[1] THE LANCET, 1928, i., 1250.

[2] Bulletin de la Société d'Obstétrique et de Gynécologie de Paris, December, 1928.

Of Mr. Metzger's five cases, in one it was impossible to dilate the cervix, in two others there was difficulty in performing version or embryotomy, the difficulties being due, in the author's opinion, to the hypertonicity of the body of the uterus caused by the spinal anæsthesia. One of the cases died of post-partum hæmorrhage on the fourth day of the puerperium, and in two other cases post-partum hæmorrhage occurred. The author, "having never seen such a rapid death from bleeding on the fourth day," thinks that the bleeding may have been due to sudden relaxation of the uterine hypertonicity. He concludes: "For my part, after what I have seen, I am little disposed to make any more trials, and I cannot too strongly recommend prudence."

Mr. Cathala's single case was treated under spinal anæsthesia, owing to the existence of tuberculous laryngitis. The dilatation of the cervix was difficult and incomplete. The child was delivered by forceps. Slight tears occurred in the cervix and fourchette. The puerperium was febrile, and the patient died in an attack of cyanosis one month and two days after delivery. Mr. Cathala gives an excellent criticism of the use of spinal anæsthesia for the purpose of facilitating the dilatation of the cervix in obstetrical cases, and of Delmas's method he says, that it should be rejected if it has no other object than to obtain "a painless delivery at a fixed hour."

I am, Sir, yours faithfully,
HERBERT R. SPENCER.

Bickenhall Mansions, London, W., Feb. 5th, 1929.

Public Health Services.

INFLUENZA.

CLINICAL reports indicate that influenza is rather more widespread throughout the country than a week ago, although in general the type of disease is mild. Prevalence in Manchester, Liverpool, and the Lancashire towns continues, and there is a spread eastward to Leeds and Bradford. The extent to which the reported deaths in London and the great towns have risen during the week is shown in the following summary. In London the epidemic is now more evenly distributed and is still described as mild in type. In the Scottish 16 towns the general death-rate fell from 37·9 to 28·2 for the week ended Feb. 9th. The towns showing a rise are Edinburgh (33·7), Dundee (37·7), Kirkcaldy (23·9), and Ayr (26·0). The general death-rate in Glasgow was 27·6. Deaths from respiratory diseases in the 16 towns numbered 449, as against 675 in the previous week, and those from influenza 220 as against 323. Pneumonia notifications fell from 1268 to 919.

Reports published by the Health Section of the League of Nations indicate that the epidemic is subsiding generally. The rate of progress of influenza across Europe has not been as rapid as it was in 1921–22 and 1926–27, and in certain limited areas on either side of the Irish Sea and North Channel the disease has prevailed in a more severe form than in either of these two outbreaks. It has been widespread in Southern Norway, in Copenhagen, and adjacent regions of Denmark, as well as on the shores of the Finnish Gulf, including both the Finnish and Esthonian coasts, but the prevailing type has been mild hitherto. In Germany only Brandenburg, Saxony, Lower Silesia, and Bremen have been seriously affected up to the present, and death-rates have in no case been more than half as high as those recorded in Western Scotland and Northern Ireland. An outbreak of average severity occurred in Madrid in January. Influenza has now made its appearance in parts of the Netherlands and Northern France, but at the beginning of February it was still rare elsewhere in Europe. The influenza epidemic which has traversed North America from west to east is now definitely on the decline.

INFECTIOUS DISEASE IN ENGLAND AND WALES DURING THE WEEK ENDED FEB. 2ND, 1929.

Notifications.—The following cases of infectious disease were notified during the week:—Small-pox, 230; scarlet fever, 2490; diphtheria, 1444; enteric fever, 34; pneumonia, 3511 (last week 2422); puerperal fever, 40; puerperal pyrexia, 129; cerebro-spinal fever, 5; acute poliomyelitis, 3; acute polio-encephalitis, 2; encephalitis lethargica, 14; dysentery, 10; ophthalmia neonatorum, 83. No case of cholera, plague, or typhus fever was notified during the week.

Cases of pneumonia were reported from every county, the largest numbers being London, 513; Chester, 151; Durham, 149; Essex, 123; Lancaster, 965; Warwick, 125; Yorks West Riding, 292.

The number of cases in the Infectious Hospitals of the Metropolitan Asylums Board on Feb. 5th–6th was as follows: Small-pox (44 under treatment, 4 under observation); scarlet fever, 1903; diphtheria, 2071; measles 56; whooping-cough, 791; puerperal fever, 19 (plus 7 babies); encephalitis lethargica, 78; poliomyelitis, 5; "other diseases," 60. At St. Margeret's Hospital there were 13 babies (plus 6 mothers) with ophthalmia neonatorum.

Deaths.—In the aggregate of great towns, including London, there was no death from small-pox, 2 (0) from enteric fever, 53 (2) from measles, 9 (2) from scarlet fever, 149 (49) from whooping-cough, 46 (13) from diphtheria, 65 (11) from diarrhœa and enteritis under two years, and 652 (198) from influenza. The figures in parentheses are those for London itself.

The number of deaths from influenza during the previous eight weeks was 60, 61, 69, 83, 99, 122, 179, and 321 respectively, the rate of rise being much steeper in the last three weeks. The figures for London during the previous eight weeks have been as follows: 10, 9, 9, 15, 18, 34, 39 and 77. The deaths from influenza in the week under review still occurred largely in the Midland and Northern counties: Liverpool, 75; Manchester, 43; St. Helens, 29; Portsmouth, 25; Southampton, 19; Birkenhead, 17; Bootle, 15; Warrington, 13; Wallasey, 11. No other great town had as many as ten. Glasgow reported 184 (a substantial diminution from 236 in the previous week), Belfast 105, and Edinburgh 41 during the same week. The two deaths from enteric fever outside London occurred at Preston and Sunderland. Liverpool reported 14 deaths from measles, Cardiff 8, and Newcastle-on-Tyne 5. In Manchester 13 deaths from whooping-cough were reported, 11 from Liverpool, 7 from Warrington. Birmingham stood highest for diphtheria with 4 deaths. Liverpool had 11 deaths from diarrhœa, Birmingham 7, and Salford 6.

The number of stillbirths registered during the week was 275 (corresponding to a rate of 42 per 1000 births), including 43 in London.

FRENCH HOSPITAL AT TANGIER.—Owing to the inadequacy of hospital accommodation at Tangier it has been decided to add a new wing and other accessories to the French hospital, thus increasing the accommodation for native patients.

CONFERENCE ON MATERNITY AND CHILD WELFARE. The fifth English-Speaking Conference on Maternity and Child Welfare, organised by the National Association for the Prevention of Infant Mortality, in coöperation with the Maternity and Child Welfare Group of the Society of Medical Officers of Health, and numerous other organisations, together with representatives from the Dominions, will be held at Friends House, Euston-road, London, N.W., from Tuesday, July 2nd, to Thursday, the 4th, with visits to institutions on Friday, the 5th. The main subjects for discussion will be the care of the child between 1 and 5 years of age; maternal mortality and morbidity; the holding of special venereal diseases clinics for women and children in connexion with maternity and child welfare departments; and the suffering entailed on mothers and young children by prolonged waiting in out-patients' departments of hospitals. Lectures and film displays will be given during the evenings, and arrangements will be made for visits to a wide range of child welfare institutions in London. Sanction has been given by the appropriate authorities for the payment of expenses of delegates from local authorities, and railway companies in Great Britain have agreed to issue tickets at reduced rates. Further information is obtainable from Miss Halford at 117, Piccadilly, London, W. 1.

Obituary.

THOMAS DUNCAN GREENLEES, M.D., F.R.S. EDIN.

WE regret to announce the death of Dr. T. D. Greenlees, which took place on Jan. 22nd at St. Leonard's-on-Sea, where he had lived in retirement for the last few years. The son of Dr. Thomas Greenlees, he was born in 1859 at Ballantrae, Ayrshire. His medical studies were pursued for a year in Glasgow University, and thereafter in Edinburgh University, where he graduated as M.B. in 1882 and as M.D. in 1901. After a short experience of general practice, he joined the staff of Garlands Asylum, Carlisle, in 1884. Three years later he became assistant medical officer to the City of London Asylum at Dartford, and in 1890 he was appointed medical superintendent of the Grahamstown Asylum, South Africa, a post which he held for over 17 years. He returned to this country in 1908 to take charge of a private asylum at Tulse Hill, resigning in 1913. He held a commission as surgeon-captain in the Boer War, and from August, 1914, to July, 1918, he was a major in the Royal Army Medical Corps, and held several important home appointments.

High intellectual attainments, alertness, great force of character, and untiring energy combined to make Dr. Greenlees a very capable asylum administrator. He did original research work as an assistant medical officer, and in 1885 he gained the blue ribbon of the Medico-Psychological Association for his prize essay on Diseases of the Circulatory System in the Insane. He also made several important contributions to psychiatry in medical journals both in this country and in South Africa and America. Handicapped though he was by his health, which was never very robust, his enthusiasm and energy carried him further than most, while his kindly and sympathetic nature made him many life-long friends. At one time president of the Caledonian Medical Society, he also represented South Africa for many years on the Council of the British Medical Association.

Dr. Greenlees is survived by his widow, two daughters, and a son.

HENRY H. L. PATCH, M.R.C.S. who died on Feb. 7th, aged 58, was in practice in Liverpool as an anæsthetist, and was held in high esteem by his colleagues in the district. He received his medical education at St. Thomas's Hospital, and after qualifying was appointed house surgeon to the Devon and Exeter Infirmary, where his grandfather and great-grandfather had been surgeons. After 18 months there he entered general practice at Chudley, Hertford, and London. Eight years ago he went to Liverpool, where he devoted his whole time to the administration of anæsthetics, in the art of which he had unusual ability. He was anæsthetist to the Royal Infirmary, the Northern Hospital, the Liverpool Medical Research Organisation, and the Ministry of Pensions. "His quiet confidence and wonderful disposition," writes a colleague, "were of great advantage to those with whom he worked. A most unselfish character and kindness of heart won for him many friends, and his death will be an irreparable loss to them all. The last three years of his life were harassed by illness, but he carried out his duties with magnificent fortitude, both in the hospitals to which he was attached and in private practice." Dr. Patch leaves a widow with a son, and two grandchildren.

Dr. HERBERT ARTHUR SMITH, who died at Ealing on Jan. 29th, in his seventy-seventh year, was the son of Dr. Thomas Smith, of Wheatley, Oxon., where he was born in 1852. He was educated at Durham and Edinburgh Universities, and studied medicine at St. Mary's and Middlesex hospitals, qualifying L.S.A., and L.R.C.P. Edin. in 1878, and M.R.C.S. Eng. in the following year. After holding house appointments at several London hospitals and acting as medical officer to cable-laying ships, he took the M.D. Durh. before settling down in general practice at Ealing. While acting as surgeon to the cottage hospital there, his interest in mental and nerve diseases grew, and he finally devoted himself largely to them alone; a study of the biological and clinical aspects of pain appeared from his pen in a hospital journal. Besides, he was a ready writer on popular scientific subjects, his last book being a collection of verses aimed at bringing the doctrines of revelation into line with modern scientific thought. To the last he remained a student, keeping closely in touch with the modern theory and practice of medicine.

WE have to record the death, on Jan. 31st, of KENNETH BAMFORD WILLIAMSON, M.B. Edin., at the age of 33, after two days' illness. The son of Mr. Bamford Williamson, of North Shields, he was educated at Mill Hill. Throughout the late war he served with the Royal Garrison Artillery, winning the Military Cross, and retiring with the rank of Major. At Edinburgh University, where he took up the study of medicine, he graduated in 1921 with second-class honours, later holding resident appointments at the Edinburgh Royal Infirmary and the Royal Maternity and Simpson Memorial Hospitals. After further experience in London, as house physician to the Paddington Green Children's Hospital, he went to Penrith as assistant to Dr. D. C. Edington, whom he subsequently joined in partnership. His work as practitioner in Penrith, where he was also medical officer to the cottage hospital, was greatly valued in the town, and at his funeral there was much evidence of the affection in which he was held. Dr. Williamson's widow, who is left with a son two months old, is a daughter of the late J. Simpson Harker, of Penrith.

JOHN ADOLPHUS SHARP, M.R.C.S., who died on Jan. 26th in his eighty-second year, spent almost the whole of his long professional career in Derby, where he was still in practice at the time of his death. He first went to the town as house surgeon to the old Derbyshire General Infirmary, soon after qualifying from Guy's Hospital in 1868, and he later became surgeon to this institution. In 1896 he retired from practice, and his place was taken by Dr. C. H. Taylor; but ten years later, on Dr. Taylor's death, he resumed his active work, and continued for the rest of his life to take a considerable part in local affairs. Dr. Sharp's widow is a daughter of the late Edward Dumas, of Derby, and he leaves a daughter and a son, Dr. J. E. Sharp, of Chelsea.

WE have received from Colonel A. W. Sheen the following tribute to the late Dr. JOHN OWEN, of Liverpool, whose death was announced last week in our columns:—

"I am minded to write a tribute of warm affection and regard, shared I know by all his war comrades, to the life and memory of John Owen. When I commanded the Welsh Hospital in India, of 3000 beds, 'Major John,' as we all knew him, was in charge of the Medical Division. His good work, his kindness, and his personal charm endeared him to all. And there were in his character special traits of modesty, humour, and fearlessness. The last was shown by his zeal for big game-hunting, and by his sorrow that his lot had not been cast in a more active theatre of war. But duty was paramount with him; our change of destination from France to India he accepted with willing cheerfulness. Although, later, the charge of a hospital ship brought him in contact with Mesopotamia, yet the field of battle did not come his way.

His loss will be felt by all the many with and for whom he lived and worked in Liverpool, and not least by his comrades in the war."

As a memorial to Dr. Owen it has been decided to open a fund to endow one or more beds in the children's ward of the Carnarvonshire and Anglesey Infirmary at Bangor. Subscriptions may be sent to Mr. Pugh, the manager of Lloyd's Bank in that city.

THE LATE DR. J. E. EDDISON.—Dr. Wardrop Griffith, of Leeds, to whom we were indebted for some of the particulars in the obituary notice last week of Dr. J. E. Eddison, writes to say that the date of Dr. Eddison's appointment to the Infirmary was earlier than stated—namely, in 1871. Dr. Griffith did not succeed Dr. Eddison directly; it was Dr. Eddison's resignation that led to his being elected as the junior member of the honorary staff.

Lieut.-Colonel C. T. Samman, Master of the Society of Apothecaries of London, informs us that Dr. DE HAVILLAND HALL, an obituary notice of whom appeared in our columns last week, was a prominent member of the Society's Court of Assistants, where his valued opinions and advice, so courteously expressed, were always listened to with great respect.

Medical News.

UNIVERSITY OF CAMBRIDGE.—At recent congregations the following degrees have been conferred:—

M.B. and M.Chir.—Francis Howitt Gillett.

B.Chir.—Donald Bagster Wilson.

ROYAL COLLEGES OF PHYSICIANS OF LONDON AND SURGEONS OF ENGLAND.—As the result of the Final Examination held from Jan. 8th to 30th the following candidates were approved in the undermentioned subjects, but are not eligible for the diplomas of the Board:—

Medicine.—Annie F. Allport, Royal Free; J. C. Arthur, Durham; Audrey Z. Baker, Univ. Coll.; S. G. Bedford, Leeds; R. M. Bolam, Cambridge; J. J. Boulle, London; W. V. Bowman, St. Thomas's; Mabel Brewster, Royal Free; T. D. T. Brocklehurst, Guy's; P. P. Chandu Nambiar, Birmingham; A. Clark, London; F. S. Cooksey, King's Coll.; D. M. Craig, Middlesex; H. R. J. Donald, Manchester; F. A. T. Edwards, St. Bart.'s; Lilian P. Edwards, Royal Free; L. M. Edwards, Cardiff and St. Bart.'s; R. G. P. Evans and R. S. M. Fisher, Middlesex; S. K. Foster, Leeds; I. Friedman, R. L. Frost, and D. K. Gaitskell, Guy's; Kathleen E. Gambrell and Alice E. N. Gilby, Royal Free; A. Gilpin, King's Coll.; C. G. Gordon-Wilson, London; Amy L. F. Hankins, Royal Free; K. W. D. Hartley, St. Bart.'s; W. Heard, Middlesex; A. H. Hennessy, Adelaide and London; I. P. G. Howells, St. Mary's; D. Hugo, Guy's; H. P. Hutchinson, St. Bart.'s; D. W. S. Kaye, King's Coll.; M. Kokia, Westminster; J. C. Lee, London; S. D. McClean and E. M. MacLachlan, Guy's; R. G. Mayer, Bristol; I. B. Morris and R. J. L. O'Donoghue, Guy's; Gwendoline Orlebar, Charing Cross; B. J. W. Pilsworth, Royal Free; H. Raj, Birmingham; B. V. P. Reddy, London; J. A. Robson, St. Bart.'s; R. M. Sargent, Univ. Coll.; B. Singer, London; D. B. Smallshaw, Guy's; J. O. Smith, Melbourne; W. H. B. Spoor, St. Thomas's and Bristol; J. B. Sugden, Leeds; R. S. Thomas, A. E. Treweek, and J. J. van Niekerk, Guy's; W. J. Walter, St. Bart.'s; S. N. Wasti, Punjab and London; G. J. S. West, Bristol; S. J. Wheeler, Guy's; Camille Wiseham, Calcutta; and Joyce R. Woods, Royal Free.

Surgery.—E. G. Abdel-Malek, Birmingham; D. A'Brook, Univ. Coll.; S. Alstead, Liverpool; H. F. Apthorpe-Webb, St. Bart.'s; J. C. Arthur, Durham; A. R. Banham, Cambridge and Middlesex; I. T. Barling, St. Thomas's; H. J. W. Bergh, St. George's; D. Bielenky, Westminster; M. Bloom, Cardiff; H. O. Clarke, Dublin; J. R. Colville, St. Bart.'s; P. A. Cooper, Univ. Coll.; W. J. Cotton and D. W. C. Cox, Guy's; D. M. Craig, Middlesex; J. R. Crumble, St. Bart.'s; F. A. D'Abreu, Birmingham; P. Dalzell, St. Bart.'s; E. C. Dayus, St. Mary's; C. D. D. de Labilliere, St. Bart.'s; Jessie E. Dodds, Sheffield; C. de M. Dorey, St. Mary's; W. J. L. Downing, Middlesex; G. Duckworth, St. George's; D. H. A. Edmondson, Liverpool; B. M. Fonseka, Middlesex; E. S. Fossey, Otago; N. D. Gerrish, Bristol; G. H. A. Graetz, St. Bart.'s; E. Grundy, Leeds; P. N. Hanson, A. G. J. Harris and R. L. H. Harris, St. Bart.'s; H. L. Hoffman, Cambridge and St. Thomas's; J. Hopton, St. Bart.'s; D. Hugo, Guy's; E. F. Hunt, St. George's; April D. James, Bristol; D. S. Jones, St. Bart.'s; R. A. Jones, Univ. Coll.; C. Jotkasthira, St. Thomas's; H. V. Knight and N. Kramer, St. Bart.'s; R. A. Leader, Guy's; J. M. Leggate, Liverpool; F. T. F. Lutter, St. George's; H. G. McGregor, Guy's; F. M. Mallinson, Univ. Coll.; R. B. Mayfield, St. Thomas's; T. J. Millin, Dublin; A. J. Moffett, Birmingham; G. B. Mohile, Guy's; Q. St. L. Myles, St. Thomas's; L. P. Naz, Univ. Coll.; E. J. Neill, Cambridge and St. Bart.'s; S. W. K. Norris and J. R. Owen, Birmingham; W. Pearce, Leeds; F. R. A. Philpott, Oxford and Charing Cross; E. S. Pope and R. K. Price, St. Bart.'s; C. F. H. Quick, St. Mary's; W. Radcliffe, St. Bart.'s; B. Rait-Smith and P. J. Richards, Cambridge and St. Bart.'s; Ivy H. V. Rowlands, Liverpool; C. StJohnston, Birmingham; R. P. W. Shackleton, St. George's; A. R. Smith and J. H. Smith, St. Thomas's; D. Stephens, St. Bart.'s; Mary S. Stuart, St. Mary's; J. B. Sugden, Leeds; L. Sumitra, St. Mary's; D. J. Turnbull and C. E. H. Turner, London; G. S. Walker, Univ. Coll.; J. V. Walker, Birmingham; R. Warnecke, London; J. H. Watkin and T. H. N. Whitehurst, St. Bart.'s; R. L. Whittaker and A. S. Wigfield, Univ. Coll.; E. R. Williams, St. Mary's; J. O. Williams, St. Bart.'s; M. G. Woolff, St. Thomas's; Mary Worthington, Royal Free; B. Wright, Cambridge and St. Bart.'s; P. Yarmarko, Middlesex; and R. H. Young, St. Thomas's.

Midwifery.—H. S. Atkinson, London; E. F. D. Baker, St. Bart.'s; G. Balasuriya, Guy's; A. R. Banham, Cambridge and Middlesex; J. R. J. Beddard, St. Bart.'s; W. V. Bowman, Cambridge and St. Thomas's; A. M. Boyd, St. Bart.'s; Julia A. Boyd, Royal Free; C. E. Brierley, Bristol; H. P. Brody, Sheffield; W. D. Brown, London; A. Buch, St. Mary's; G. H. Buck, Westminster; A. C. Byles, St. Mary's; S. Chopra, Punjab and Edinburgh; Rosa O. J. Clark, Royal Free; G. J. Clarke, Guy's; A. L. Climer and J. R. Colville, St. Bart.'s; F. A. d'Abreu, Birmingham; P. Dalzell, St. Bart.'s; H. B. A. R. Densham, Guy's; M. B. Dixit, Bombay and St. Thomas's; H. R. J. Donald, Manchester; W. J. L. Downing, Middlesex; C. M. Duncan, St. Bart.'s; Lilian P. Edwards, Royal Free; E. G. Evans, Univ. Coll.; I. Q. Evans, St. Bart.'s; M. D. A. Evans, Univ. Coll.; R. S. M. Fisher, Middlesex; G. M. Flemming, St. Bart.'s; B. M. Fonseka, Middlesex; E. S. Fossey, Otago; S. K. Foster, Leeds; D. K. Gaitskell, Guy's; Kathleen E. Gambrell, Royal Free; W. W. Gerrard, Liverpool; S. E. F. Gooding, London; G. H. Greenway, Guy's; V. S. Hariharan, Madras; D. Hay, St. Bart.'s; Geraldine J. G. Hayes, Manchester; Aureval Heaton, Royal Free; H. L. Hoffman, St. Thomas's; R. E. Holmes, London; I. P. G. Howells, St. Mary's; W. V. Howells, London; A. H. Hussein, Cairo and Edinburgh; April D. James, Bristol; N. R. Jeffery, Manchester; J. L. Jekyll, London; D. S. Jones, St. Bart.'s; K. S. Keele, Guy's; S. A. Kelany, Birmingham; H. V. Knight, Cambridge and St. Bart.'s; N. Kramer, St. Bart.'s; E. E. Lewis, St. Mary's; W. E. B. Lloyd, St. Bart.'s; O. V. Lloyd-Davies, Middlesex; F. D. MacCarthy, St. George's; R. W. McConnel, King's Coll.; W. A. R. Mailer, St. Bart.'s; R. G. Mayer, Bristol; R. B. Mayfield, St. Thomas's; T. J. Millin, Dublin; W. J. Moffat, St. Thomas's; A. J. Moffett, Birmingham; E. J. Neill, Cambridge and St. Bart.'s; J. R. Owen, Birmingham; G. A. Y. Parker and A. S. Philps, St. Bart.'s; Betty J. W. Pilsworth, Royal Free; E. S. Pope and C. B. Prowse, St. Bart.'s; T. P. V. Rao, St. Thomas's; W. H. Reynolds, Cardiff; J. A. Rogers, King's Coll.; H. L. Rogerson, St. Bart.'s; A. Said, Birmingham; R. W. Scanlon, St. Thomas's; J. D. Scott, St. Bart.'s; K. M. Seedat, Charing Cross; R. P. W. Shackleton, St. George's; Eileen M. M. Shaw, Westminster; Everell M. Shippam, Royal Free; C. B. Singh, Lucknow; F. J. G. Slater, Cambridge and Durham; C. H. Smith and J. H. Smith, St. Thomas's; J. O. Smith, Melbourne; N. Solomon, St. Bart.'s; L. Tarneja, Univ. Coll.; D. M. Thomas, Cardiff and Middlesex; J. M. Thomas, Cardiff and Univ. Coll.; D. J. Turnbull, London; E. Vitenson, Guy's; G. S. Walker, Univ. Coll.; J. V. Walker, Birmingham; W. W. Walther, Univ. Coll.; J. H. Watkin, St. Bart.'s; G. J. S. West, Bristol; A. J. White, Middlesex; R. L. Whittaker and A. S. Wigfield, Univ. Coll.; E. R. Williams, St. Mary's; J. K. Willson-Pepper, St. Thomas's; Camille Wiseham, Calcutta; Joyce R. Woods and Mary Worthington, Royal Free.

Pathology (New Regs.).—F. I. Ashton, St. Thomas's; D. M. Craig, Middlesex; D. H. A. Edmondson, Liverpool; D. Ezekiel, Charing Cross; R. G. S. Howe, Univ. Coll.; E. Johnson, Manchester; M. Kremer, Middlesex; E. R. G. Passe, London; R. K. Price, St. Bart.'s; B. Ram, St. Thomas's; D. P. Turner, King's Coll.; W. W. Walther, Univ. Coll.; S. J. Wheeler, Guy's; and J. K. Willson-Pepper, St. Thomas's.

UNIVERSITY OF LONDON.—At a meeting of the Senate on Jan. 23rd Mr. H. L. Eason was reappointed representative of the University on the General Medical Council.

The University medal at the M.D. Examination (Branch I, Medicine), December, 1928, has been awarded to Horace Joules, of Middlesex Hospital, and the University medal at the M.B., B.S. Examination, November, 1928, has been awarded to Harold Percival Himsworth, of University College Hospital.

Applications will be invited between May 1st and June 15th for grants from the Thomas Smythe Hughes Medical Research Fund for the assistance of original medical research. The Senate will also shortly consider applications for grants from the Dixon Fund for assisting scientific investigations. Further particulars of these funds may be had from the Academic Registrar.

A University studentship in physiology, of £100 for one year, is offered to a candidate suitably qualified for research. Applications must be received in proper form by the Principal Officer by May 31st.

UNIVERSITY OF LIVERPOOL.—Mrs. Adami, widow of the late Vice-Chancellor, Prof. George Adami, has given £100 for the further endowment of the George Adami Prize in Pathology.

LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE.—As a result of the terminal examination in the Division of Tropical Medicine and Hygiene of this School, the Duncan medal was awarded to Dr. S. Batchelor.

EUGENICS SOCIETY.—The Galton anniversary dinner will be held at the Rembrandt Hotel, Brompton-road, London, S.W., on Feb. 16th, at 7.15 P.M. The Galton lecture, entitled The Coming of Age of the Eugenics Society, will be delivered by Major Leonard Darwin, Sc.D.

ROYAL MICROSCOPICAL SOCIETY.—A meeting will be held at the house of the society at 20, Hanover-square, London, W., on Feb. 20th, at 8 P.M. Papers will be read on some Effects on Cell Division in vitro of Radium (Dr. R. G. Canti and Mr. F. G. Spear), and of X rays (Miss S. F. Cox). Mr. F. G. Spear will also describe an Effect of Low Temperature on Cell Division in vitro, and demonstrations will be given in connexion with these communications.

ST. ANNE'S HOME SCHOLARSHIP.—The Council of Epsom College will shortly elect a girl to a St. Anne's Home Scholarship of £52 a year. Candidates must be fully 7 years of age and not over 12 years of age on May 1st next, and must be orphan daughters of medical men who have been for not less than five years in independent practice in England or Wales. Application must be made by March 8th, on a form to be obtained from the Secretary of the College, at 49, Bedford-square, London, W.C. 1.

VOYAGE D'ÉTUDES MÉDICALES.—The twenty-second tour of the V.E.M. to French watering places will take place in the Alps during the first fortnight of September, 1929, under the leadership of Professors Paul Carnot, Maurice Villaret, and A. Piéry. After visiting the Faculty of Medicine at Lyons the party will assemble at Vals-les-Bains. The tour will be made by motor coach from Briançon to Evian-les-Bains, where it ends. The spas of the "Briançonnais," "Dauphiné," and "Savoie" will be visited in succession. The detailed programme and cost of the tour will be published later, but further information may now be obtained from Madame Juppé-Blaise, Federation of the Health Resorts of France, 1, Gordon-square, London, W.C. 1.

"THE ANTISEPTIC": SILVER JUBILEE.—Twenty-five years ago the *Antiseptic* was started to meet the needs of the medical profession in South India for scientific medical information by the Hon. U. Rama Rau and the late Dr. T. M. Nair. The former, who is now the editor, has written the story of the journal through a quarter of a century, and has sent us an advance proof of his essay which will appear in the Silver Jubilee issue of the *Antiseptic* in April next. The whole policy of the journal need not be endorsed, while we approve its whole-hearted desire to promote medical reform in India, and the following quotation is a good example of the editor's practical outlook: "The medical profession, in their dealings with the lay public, have a hard time in convincing them of the benefits of fresh air, pure water, nutritious food, good exercise, sound sleep, and a host of other things which are indispensable not only to cure them of their maladies, but also to prevent them from contracting fresh ailments. The lay public consequently require to be educated, too, in matters of health and hygiene, if the medical profession should claim absolute success in their career."

In describing the activities of the journal during the past 25 years, the writer summarises the difficulties under which the I.M.S. worked at the commencement of the twentieth century, and explains the position of the subordinate medical services and their need for reform, pointing out the various changes which the *Antiseptic* considered necessary and which in some cases it may congratulate itself on having successfully brought about. Efforts to put down quackery, to provide the better staffing of the Madras General Hospital, to secure the reorganisation of the subordinate medical department of the Madras Presidency, and the subject of hospital abuse were also matters in which the *Antiseptic* has been strenuously concerned, while it has exhorted members of the medical profession to take a larger part in public life, there being need for more medical men in municipalities, district boards, and legislative councils. "A medical man becoming a minister of medicine and public health in a province will be the greatest blessing to the people."

Parliamentary Intelligence.

NOTES ON CURRENT TOPICS.

LOCAL GOVERNMENT (SCOTLAND) BILL.

THE House of Commons went into Committee on the Local Government (Scotland) Bill on Thursday, Feb. 7th, Mr. J. F. HOPE (Chairman of Committees) in the chair.

Power of Delegation to Town Councils of Small Burghs.

On Clause 13 a Government amendment was agreed to providing that a county council might, on such terms and conditions as the councils concerned might agree to, appoint the town council of any small burgh, or the district council of a district within the county, or a joint committee of such a town council and district council of which the members of the county council for the burgh and district should be members, to act as agents of the county council to carry out locally with certain exceptions functions vested in the county council. The excepted functions were those relating to education and police, and it was further provided that a function relating to any form of medical or surgical treatment should only be delegated with the approval of the central department.

The clause was added to the Bill by 195 votes to 102.

Schemes for Administration of Functions.

On clause 14 Major ELLIOT (Under-Secretary of State for Scotland) moved a lengthy amendment which included the following:—

"An administrative scheme may provide that any assistance to which this Sub-section applies, which might after the commencement of this Act be provided either by way of poor relief or by virtue of any enactment other than the Poor-law Acts, shall be provided exclusively under and by virtue of the enactments other than the Poor-law Acts and not by way of poor relief, but nothing in this Sub-section or in any scheme shall diminish or otherwise affect the duty of the council to provide relief for the poor.

"The assistance to which this Sub-section applies shall be the maintenance and treatment of sick persons, including, without prejudice to the said generality, persons suffering from any infectious or other disease, or lunatics or persons mentally deficient, or the provision made for the health of expectant mothers, nursing mothers, or children under five years of age or for blind persons, or for the feeding, clothing, and treatment of school children.

"Every administrative scheme relating to education made by the council of a county within which a large burgh is included for the purpose of education shall, unless the county council and the town council of the large burgh otherwise agree, make provision whereby for the purpose of the medical inspection, supervision, and treatment of the children attending the schools within the burgh, the county council shall utilise to such extent, and on such terms and conditions as the councils agree or, failing agreement, as the Department of Health determine, the medical and nursing staff of the town council, and the clinics and hospitals under the control of that council, and every such scheme which shall be made by the county council, and approved by the department only after consultation with the town council shall be binding upon the town council.

He said that this amendment was of very considerable importance, and would, he thought, be welcomed in all parts of the Committee. It provided for the break up of the poor-law, and it was to be taken in conjunction with a new clause, which would be moved later, dealing with the wide extension of hospital facilities and the provision of hospital facilities other than under the Poor Law Acts for sick persons in cities and counties. There was at present a great bundle of duties of most varying kinds applied to persons in varying circumstances wrapped up together under the heading of the poor-law. This dealt more particularly with one group, that of the sick. This was one of the steps for which it was worth while introducing the Bill. The new clause to which he had referred was most important. It was a step which had been recommended by many committees, and it had been unanimously pressed upon the attention of the Government. It was another forward step in the history of public health in Scotland.

Mr. J. STEWART said that he agreed that there was good in this amendment, but he regretted that the Government had not taken this opportunity to consolidate public health and make it a unified treatment, taking away any degrading conditions, so that it would be as free as the present method of dealing with infectious diseases was free. Under this provision a man who was suffering from epilepsy, acquired through no fault of his own, or suffering from cardiac disease, would be compelled, if he was able, to pay for treatment, and if he was not able his child, or someone else who was connected with him in a degree which made the burden legal, would be compelled to pay. He (Mr. Stewart) hated this proposal, and he wished that every member of the Committee hated it as he did.

After considerable debate,

Mr. WESTWOOD moved an amendment to the amendment which would have the effect of making the Government's proposals mandatory and not permissive.

Sir J. GILMOUR (Secretary of State for Scotland) said that it was not possible to make the proposals purely mandatory. They would enable a local authority to produce a scheme, after consultation with all the voluntary institutions in its district, to take into poor-law institutions cases that were at present outside that system. It opened a way to the complete revision and break up of the present system.

The amendment to the amendment was negatived by 197 votes to 107, and the Government amendment was agreed to.

Clause 14 was added to the Bill.

THE LOCAL GOVERNMENT BILL.

On Tuesday, Feb. 12th, the Local Government Bill was considered on Report.

Administrative Schemes.

On Clause 4 Mr. WITHERS moved an amendment providing that a county council, in the preparation of any scheme relating to hospitals, should consult with the representative of the voluntary hospitals in the area, with a view to coöperation in the treatment of the sick and the avoidance of overlapping. He said that he wished to secure that there should be consultation between the Public Assistance Committees when formed and the voluntary hospitals. His object was to provide the most efficient service for the sick when the scheme came into operation. The voluntary hospitals had a very high standard of efficiency in their technical work, and there was an admirable spirit behind that work. When the county councils took over the local infirmaries it was very important that there should be coöperation between what would be the county council hospitals and the voluntary hospitals. Otherwise there would be overlapping, and trouble would arise. It must be disastrous to the voluntary hospitals if the impression was given that those two classes of hospitals were in competition. It was very important that they should work together in harmony and that it should be understood that the one was not going to supersede the other.

Major GLYN seconded the amendment.

Mr. CHAMBERLAIN (Minister of Health) said that any county council in preparing a scheme must have regard to the voluntary hospital provision already existing in the area. It was obvious that no scheme which proposed to deal with the hospital services of an area could really be adequate unless it took account of existing accommodation in the voluntary hospitals. He was, therefore, in full sympathy with the general idea of Mr. Withers that there should be consultation and coöperation between the two classes of hospitals; but he did not think it would be possible to insert this particular amendment. If they were to provide for consultation with representatives of the voluntary hospitals, logically they could not stop there. There were other voluntary associations doing work on parallel lines with some of the work which it would be the duty of the county councils to perform, and if they were to consult with the representatives of the voluntary hospitals it would only be logical to say that they must consult also with representatives of those other associations. Another practical difficulty was that neither the voluntary hospitals nor those other bodies were organised. There was no system by which they could as a body consult with the county council, and therefore to make that a statutory provision would be a mistake. His view was that consultation and coöperation would take place between the voluntary hospitals and the public authorities, but it would not be acceptable to the local authorities if Parliament were to try to lay down precisely how that consultation and coöperation should be carried out.

Mr. E. BROWN said he regretted that the Minister of Health could not accept the amendment. It was very important that the voluntary hospitals should be considered in any scheme of reorganisation.

Major GLYN said that in rural areas a very large number of workers had long been contributing each week to the voluntary hospitals, and it would be hard upon them if the scheme did not take into account the enormous amount of work which had been done in consequence of their contributions. Those interested in hospital work felt that some organisation—even if it had to be created ad hoc—ought to be taken into consultation in connexion with this scheme.

Mr. WEDGWOOD BENN, in supporting the amendment, pointed out that under the safeguarding provisions the Government taxed drugs used by hospitals. Two days ago a document was published saying that the assessments of hospitals were to be raised.

Sir R. SANDERS said that on almost every county council there was someone who represented the voluntary hospitals and who looked after their interests.

Colonel GRETTON said that, as one who had a great deal to do with the administration of two local hospitals, he wished to urge Mr. Chamberlain to accept the amendment. The large hospitals in the country, no less than those in the Metropolis, ought to be taken into consultation in these matters because they were schools of medicine; they provided the ground where the medical profession received its training, and they would not be superseded by the system which the Minister had set up.

Mr. HARRIS said that the London County Council had already considered this problem so far as London was concerned, and their way was comparatively easy. They had the King Edward Hospital Fund in London, and had an immense opportunity of making something like a perfect hospital system for the metropolitan area.

The amendment was negatived without a division.

VIVISECTION.

On Feb. 7th Lieut.-Commander KENWORTHY presented a petition signed by 9829 persons "praying that the House do prevent the practice of vivisection, believing that it is wrong to inflict pain and disease on living animals."

HOUSE OF LORDS.

THURSDAY, FEB. 7TH.

PROTECTION OF ANIMALS AMENDMENT BILL.

Lord BANBURY moved the third reading of the Protection of Animals (Amendment) Bill.

The Marquess of SALISBURY (Lord Privy Seal) said the Government had been placed in a great difficulty over the Bill. They were unwilling to oppose it, partly out of consideration of Lord Banbury, and partly because its main object was to prevent the odious crime of cruelty to dogs. But from the beginning they were convinced that the Bill was unworkable. Some of the amendments which had been passed made it more unworkable still, and on the whole the Bill was not likely to prove an effective piece of legislation. The procedure of the Bill was not only ineffective but cumbersome. He contended that the procedure was not justified by the small number of cases of cruelty to dogs which occurred in Great Britain.

After some discussion the Bill was rejected on a division by 24 votes to 18—majority against, 6.

HOUSE OF COMMONS.

WEDNESDAY, FEB. 6TH.

Hygiene on British Ships.

Dr. VERNON DAVIES asked the President of the Board of Trade if it was proposed that the joint committee recently set up by the Minister of Health and himself should inquire into the question of hygiene of crews' spaces, with a view to reporting on the sufficiency and efficiency, or otherwise, of the existing sanitary code to secure a reasonable standard of sanitary requirements for all British ships.—Mr. HERBERT G. WILLIAMS (Parliamentary Secretary to the Board of Trade) replied: The question of crew spaces on board ship is within the scope of the joint advisory Committee set up by the Ministry of Health and Board of Trade, and a special series of reports on the subject have been placed before the Committee for their consideration.

Dr. VERNON DAVIES asked the President of the Board of Trade if he had received representations from the Society of Medical Officers of Health, the Royal Sanitary Institute, the Merchant Service Guild, and the Association of Port Sanitary Authorities, stating that the conditions under which merchant seamen were housed on British ships were, from a hygienic standpoint, unsatisfactory and inferior to those on ships of similar tonnage of certain other nationalities; and what reply he had returned.—Mr. HERBERT G. WILLIAMS replied: Representations have been received from one of the bodies mentioned. No detailed reply was sent, but those representations will be considered in connexion with any amendment of the crew space regulations, which are now under review. The conditions on some British ships, especially some of the smaller and older ships, cannot be regarded as satisfactory, and the conditions on some foreign ships are very good; but it is misleading to suggest that crew spaces on British ships generally are unsatisfactory from the hygienic standpoint and inferior to those on foreign ships.

Dr. DAVIES also asked the President of the Board of Trade if he was aware that during 1917 and 1918 the Board of Trade possessed statutory powers to decide the type and position of crews' spaces on British merchant ships; to insist upon the provision of such amenities as two-berth cabins, mess rooms, bath and wash rooms, drying rooms, outside oilskin lockers, and hospital room, as well as to

compel w.c. accommodation as a matter of necessity and without consideration respecting tonnage reductions; that these powers were not at present being enforced; and if he proposed to take any steps to restore these war-time amenities to merchant seamen in British ships.—Mr. HERBERT G. WILLIAMS replied: The statutory powers of the Board of Trade in this matter have not changed, and any changes made in the instructions have been in the direction of requiring a higher standard. I may add that many owners go considerably beyond the minimum requirements.

The Poison Gas Protocol.

Sir ROBERT THOMAS asked the Secretary of State for Foreign Affairs whether he was not prepared immediately to ratify the poison gas protocol of the League of Nations, he would announce through the League that ratification by this country might be regarded as coming automatically into force as soon as the other signatories had ratified it.—Sir A. CHAMBERLAIN replied: It has been announced on more than one occasion in this House that H.M. Government are not prepared to ratify the Gas Protocol unless all the other signatories are ready to do so. The position taken by H.M. Government is thus a matter of common knowledge, and I do not consider that any further pronouncement would lead to any useful results.

THURSDAY, FEB. 7TH.

Maternity and Child Welfare Grants.

Sir ROBERT NEWMAN asked the Minister of Health, with regard to the schemes which had been submitted to the Ministry by county boroughs and other local authorities for building new maternity and child welfare centres, whether in cases where the schemes had been already approved by the Ministry on the principle of a 50 percentage grant, that undertaking would be adhered to by the Ministry, if the local authority so desire it.—Mr. CHAMBERLAIN replied: No, Sir. The grants for maternity and child welfare other than the training of midwives and health visitors will be wholly discontinued after March 31st, 1930, and will be absorbed in the new grants to be given under the Bill.

Cancer Mortality.

Mr. R. MORRISON asked the Minister of Health if he would give the figures, to the last available date, of the number of deaths from cancer of men, women, and children respectively.—Mr. CHAMBERLAIN replied: The most recent figures available are those for 1927, in which year the deaths from cancer in England and Wales were:—

Children under 15 years of age ..	213
Males of 15 years of age and over ..	24,946
Females ,, ,, ,, ,, ..	28,919
Total, all ages and sexes	54,078

Criminal Lunatics.

Sir HARRY BRITTAIN asked the Home Secretary (1) whether, in deciding as to the release or detention of a criminal lunatic, the Home Office was guided solely by medical considerations or if other considerations were likewise included; and whether the opinion of the medical superintendent of the asylum was alone considered or whether that of an independent man was obtained; and (2) whether there were periodical or any examinations of criminal lunatics with a view to ascertaining if they were still of unsound mind and, if so, by whom were such examinations made; and how many, if any, criminal lunatics had during the last ten years been discharged as cured or been transferred to some other home or institution respectively.—Sir W. JOYNSON-HICKS replied: The Secretary of State has regard to all the circumstances. So far as medical considerations are concerned, he is guided mainly by the view of the skilled medical authorities at Broadmoor Criminal Lunatic Asylum—or, if the patient be in a local mental hospital, by the views of the superintendent and of his own medical advisers. All criminal lunatics are constantly under skilled medical observation, and reports on each of them are made to me, both periodically and upon occasion, by the superintendents of the asylums. As the Secretary of State has regard to all the circumstances, and not to medical considerations alone, discharge does not depend entirely upon any single definite factor such as entire recovery or complete cure, nor does transfer from one institute to another necessarily connote cure or recovery. The figures asked for cannot therefore be given.

The Purchase of Radium.

Mr. ROBERT MORRISON asked the Minister of Health, in view of the fact that the Swedish nation had recently purchased six grammes of radium sulphate at an approximate cost of £10,000 per gramme, whether he would inquire into the possibility of a similar purchase being made by his department, thus effecting a saving of £2000 per gramme on the price of £12,000 at present being charged to British purchasers.—Mr. CHAMBERLAIN replied: I have seen press reports to the same effect as the first part of the question. I have no funds at my disposal for the purchase of radium, but the whole question will be considered by the Government when the report of the subcommittee of the Committee of Civil Research has been received.

Geneva Opium Convention.

Sir ROBERT GOWER asked the Home Secretary which of the member States of the League of Nations had ratified the Geneva Opium Convention, and which of them had declined or neglected respectively to do so.—Mr. G. LOCKER-LAMPSON (Under-Secretary for Foreign Affairs) replied: The Geneva Opium Convention has been ratified in respect of all parts of His Majesty's Dominions except the Irish Free State. Of the other members of the League of Nations I understand that the following have ratified, or acceded without qualification:—Austria, Belgium, Bulgaria, Czecho-Slovakia, Dominican Republic, Finland, France, Japan, Latvia, Luxemburg, Netherlands, Poland, Portugal, Roumania, Salvador, and Spain; and the following have signed, or acceded subject to ratification, but have not so far ratified:—Albania, Bolivia, Chile, Cuba, Denmark, Germany, Greece, Hungary, Italy, Nicaragua, Persia, Serb-Croat-Slovene State, Siam, Switzerland, Uruguay, and Venezuela.

MONDAY, FEB. 11TH.

Radium and the Treatment of Cancer.

Mr. ROBERT MORRISON asked the Minister of Health whether it had now been decided to recognise North Middlesex Hospital as the centre available for radium treatment for Middlesex; and, in view of the large mortality from cancer, whether he would take steps to speed up the arrangements necessary so that the work might commence at an early date.—Sir KINGSLEY WOOD (Parliamentary Secretary to the Ministry of Health) replied: My right hon. friend has approved arrangements under which the Edmonton Board of Guardians will obtain a supply of radium for the treatment of particular forms of cancer at the infirmary of the guardians which is known as the North Middlesex Hospital, and one of the terms of the arrangement is that in so far as the radium may not be in use for persons chargeable to the guardians, it shall be used for similar cases from other unions in the adjacent parts of Middlesex. There has been and will be no avoidable delay on my right hon. friend's part in bringing the arrangements into operation.

Import Duty on Radium Compounds.

Mr. WEDGWOOD BENN asked the Secretary to the Treasury whether radium and radium compounds were at present subject to an import duty; and, if so, at what rate.—Mr. A. M. SAMUEL replied: The item "radium compounds" is included in the list of chemicals liable to a duty of 33⅓ per cent. ad valorem issued by the Board of Trade under Part I. of the Safeguarding of Industries Act, 1921, but these compounds are exempted from duty until June 30th, 1929, by Treasury Order made under Section 10 (5) of the Finance Act, 1926. Radium is not dealt with commercially except in the form of a compound.

TUESDAY, FEB. 12TH.

Nervous Diseases among Telephonists.

Sir ROBERT THOMAS asked the Postmaster-General what number and percentage of girls employed in telephone exchanges in London during the past year had been recorded as suffering from nervous complaints, slight or serious; what was the maximum continuous period of duty during the busy hours of the day; and what was the maximum number of lines allotted to one attendant.—Sir W. MITCHELL-THOMSON replied: A considerable amount of time and Labour would be required to furnish the information asked by the hon. baronet; but I am in a position to give corresponding figures for 1926. In that year, out of 79,712 days of sick leave taken by London telephonists; 4193 days were attributed to neurasthenia, nervous debility, nervous exhaustion, nervous shock, and neurosis; 385 days to neuritis; 1592 days to neuralgia. The total number of telephonists employed was 7051, but there is no record of the number of telephonists who were absent on account of these disorders. The normal maximum continuous period of duty covering the busy hours of the day is three and a half hours. This is sometimes extended to four hours; but the duty in either case includes some time outside the busy period. The number of lines allocated to any one operator varies from 60 to 260, the average number being 120.

Protection against Gases in War Time.

Mr. ROBERT MORRISON asked the Prime Minister whether any scheme would be issued to local authorities and others concerned for the protection of town populations from

chemical gases in future warfare, providing for gas-proof rooms, flushing of streets with appropriate chemicals, decontaminating clothing, and providing first-aid and removals to hospitals; and what steps were being taken to provide the necessary preliminary training in these matters.—Mr. BALDWIN replied: The problem of the protection of the civil population against air attack is being closely studied in all its aspects, including those specifically referred to in the question by the hon. Member. The need for the preliminary training of personnel and for the preparation of full and precise instructions to all concerned is not being overlooked.

Appointments.

COBB, J. H., M.B., B.S. Lond., F.R.C.S. Eng. & Edin., has been appointed Surgeon to the Ear, Nose and Throat Department of Sheffield Royal Infirmary.

MACINTYRE, E. J., M.B., Ch.B. Glasg., Assistant Tuberculosis Officer, Bermondsey.

TAYLOR, W., M.D., Ch.B., Aberd., D.P.H., County Medical Officer of Health for Salop.

WITTS, L. J., M.D. Manch., L.R.C.P. Lond., Assistant to the Medical Unit of the London Hospital, Assistant Physician to Guy's Hospital.

Paddington Green Children's Hospital: ELLIS, V. H., M.B., B.Chir. Camb., F.R.C.S. Eng., Honorary Surgeon to Out-patients; MCLAGGAN, J. D., M.B., Ch.B. Aberd., F.R.C.S. Eng. & Edin., Additional Honorary Surgeon to Ear, Nose and Throat Department.

Sheffield Royal Hospital: STONE, DORIS M., M.D. Lond., D.P.H., full time Assistant Pathologist; CALLCUTT, J. SHIRLEY, M.B., Ch.B., Resident Surgical Officer; HYNES, W., M.B., Ch.B., Senior Casualty Officer; PATTERSON, W. J., M.B., B.Ch., and RAINSFORD, C., M.B., B.Ch., House Surgeons; MAXWELL, C. G., M.B., B.Ch., and GUMPERT, T. E., M.B., Ch.B., House Physicians; ALCOCK, W., M.B., Ch.B., and LAVERY, M. B., M.B., B.Ch., Assistant House Surgeons; ROSENFIELD, E., M.B., B.Ch., Ophthalmic House Surgeon; FROGGATT, G. H. V., L.R.C.P., M.R.C.S., Aural House Surgeon; and STEWART, W. J., M.B., B.Ch., Resident Anæsthetist.

Certifying Surgeons under the Factory and Workshop Acts: FLOOD, J. W., L.R.C.P.I., L.R.C.S.I. (Crosby, Lancs); GORDON, J. D., M.B., Ch.B. Aberd. (Bolsover); WILLIS, T. G., L.R.C.P. Lond., M.R.C.S. (Wendron, Cornwall).

Vacancies.

For further information refer to the advertisement columns.

Basutoland.—M.O. £550.

Bath, Royal United Hospital.—H.P., H.S., also Asst. H.S. At rate of £120 and £100 respectively.

Bethnal Green Metropolitan Borough.—M.O.H. £1000.

Bedford County Hospital.—Asst. H.S. At rate of £130.

Bradford, Municipal General Hospital, St. Luke's.—H.P.'s and H.S.'s. Each at rate of £200.

Bradford, Royal Eye and Ear Hospital.—Jun. H.S. £120.

Bristol Royal Infirmary.—H.P.'s, H.S.'s, Dental H.S., &c. Each at rate of £80.

Cancer Hospital, Fulham-road.—Director of Electrical and Radio-Therapeutic Dept.

Cardiff Royal Infirmary.—Ophthalmic H.S. At rate of £75.

Cardiff, University College of South Wales and Monmouthshire.—Lecturer and Demonstrator in Anatomy. £400.

Carlisle, Cumberland Infirmary.—H.P. and H.S. Each at rate of £155.

Chester Royal Infirmary.—Hon. Asst. Surgeon.

Dorchester, Dorset Mental Hospital.—Sen. Asst. M.O. £400.

East African Medical Service.—M.O.'s and Health O.'s. £600 and £660 respectively.

Glasgow, Hawkhead Asylum, Crookston.—Jun. Asst. M.O. £275.

Gloucester County Mental Hospital.—Jun. Asst. M.O. £350.

Gloucester, Gloucestershire Royal Infirmary.—2nd H.S. At rate of £100.

Grove Park Hospital, Lee, S.E.—Jun. Asst. M.O. £500.

Guy's Hospital Medical School.—Gull Studentship in Pathology and Allied Subjects. £250.

Hertford County Hospital.—Res. Surg. O. At rate of £250.

Hong-Kong.—M.O. £600.

King Edward Memorial Hospital, Ealing.—Secretary-Supt. £400.

Leeds, General Hospital.—Two Anæsthetists. £25.

Leicester Royal Infirmary.—Preliminary notice of expected vacancies. At rate of £125.

Liverpool, David Lewis Northern Hospital.—H.S. for Orthopædic, &c. At rate of £100.

L.C.C. Mental Hospital Service.—Eighth Asst. M.O. £300.

Lucknow University.—Professorship of Medicine and Physician to King George's Hospital. Rs.1200–50–1400 p.m.

Manchester, Ancoats Hospital.—H.S. Orthopædic. £100.

Manchester and Salford Hospital for Skin Diseases.—H.S. £100.

Manchester, Victoria Memorial Jewish Hospital.—Sen. H.S. £250.

Miller General Hospital for South East London, Greenwich-road, S.E.—Res. M.O., Cas. O., and H.P. At rate of £250, £150, and £125 respectively.

Newcastle-upon-Tyne, Hospital for Sick Children.—Jun. H.S. At rate of £100. Also Res. H.P. and Res. H.S. Each at rate of £95.

Newport, Mon., County Borough Mental Hospital.—Asst. M.O. £300.

Northern Rhodesia.—M.O. £600.

Queen's Hospital for Children, Hackney-road, E.—Anæsthetist. £25. Also Res. M.O. £200.

Rampton State Institution for Mental Defectives, near Retford.—M.O. £536 10s.

Richmond, Surrey Royal Hospital.—Refractionist. £50.

Rotherham Hospital.—H.P. £180.

Royal Dental Hospital of London, 32, Leicester-square, W.C.—Two Hon. Asst. Anæsthetists.

Royal London Ophthalmic Hospital, City-road, E.C.—Sen. H.S. At rate of £150.

Royal National Orthopædic Hospital, 234, Great Portland-street, W.—H.S. Also H.S. for Country Branch at Stanmore, Middlesex. Each at rate of £150.

St. John's Hospital for Diseases of the Skin, Leicester-square, W.C.—Sen. and Jun. Hon. Med. Registrars.

Sheffield, Royal Infirmary.—Vacancy on Hon. Surgical Staff.

Southampton, Royal South Hants and Southampton Hospital.—Sen. H.S. £175, H.P. £130, Jun. H.S. At rate of £130. Also Cas. O. At rate of £120.

Surrey Administrative County of.—County M.O.H. £1800.

Surrey, County Council.—Asst. M.O. £600.

Torquay, Torbay Hospital.—H.P. £150.

Warwick County Mental Hospital, Hatton.—Jun. Asst. M.O. £350.

West Bromwich and District General Hospital.—H.S., H.P. Also Cas. H.S. Each at rate of £200.

Woolwich and District War Memorial Hospital, Shooter's Hill, S.E.—Hon. Sen. Dental Surg., Hon. Dental Surg. Also Asst. Phys. to the Radiological Dept. £50.

Births, Marriages, and Deaths.

BIRTHS.

BUTTER.—At 5, St. Albans-road, N.W.5, on Feb. 8th, to Dr. and Mrs. A. J. M. Butter—a son.

GEBBIE.—At "Branscombe," Davenport Park, Stockport, on 5th inst., to Helen Young Murdoch, M.A., M.B., Ch.B., and Nicolas Gebbie, M.D., D.P.H.—a son.

MOODIE.—On Feb. 9th, at Dudley House, Beaumont-street, W., the wife of William Moodie, M.D., M.R.C.P., of a daughter.

MURPHY.—On Jan. 20th, at The Beeches, Middlewick, the wife of James Murphy, F.R.C.S., of a daughter.

ROBERTSON.—On Feb. 10th, at The Mount, York, the wife of Dr. Douglas A. Robertson, of a daughter.

MARRIAGES.

FAWKES—GREEN.—On Feb. 9th, at St. Matthew's, Ealing Common, Roland Beattie Fawkes, D.S.O., M.A., M.R.C.P., to Beryl Constance, eldest daughter of Mr. and Mrs. Walter Green, of Ealing, W.

DEATHS.

ANDERSON.—On Feb. 2nd, at Twyford, Winchester, Deputy Inspector-General I. H. Anderson, M.D., R.N. (retired), aged 80.

BLACKBURN.—On Feb. 11th, at Arncliffe, Half Edge-lane, Eccles, Harriet, the dearly loved wife of A. E. H. Blackburn, Ph.C., Honorary Visiting Apothecary to the Manchester Royal Infirmary, Salford Royal Hospital, and St. Mary's Hospitals.

GEORGE.—On Jan. 31st, at Margate, Howard Trevelyan George, M.R.C.S., L.R.C.P. Lond., late Senior Chief Assistant, X Ray Department, St. Bartholomew's Hospital, and Hon. Medical Officer in Charge, X Ray Department, St. Andrew's Hospital, Dollis Hill, London.

JACOB.—On Feb. 1st, at St. Helier, Jersey, Archibald Hamilton Jacob, L.R.C.P.I., L.R.C.S.I., late Temporary Captain, R.A.M.C., and Tuberculosis Officer, Essex County Council, aged 61.

MORIER.—On Feb. 2nd, at Maida Vale-mansions, W., Dr. Charles George Drummond Morier.

PATCH.—On Feb. 7th, at a nursing home, Henry Herbert Lloyd Patch, L.R.C.P., M.R.C.S., aged 59.

STEWART.—On Feb. 10th, at Redcliffe-gardens, S.W., Howard Douglas Stewart, M.R.C.S., L.R.C.P., L.S.A. aged 78.

TOLMIE.—On Feb. 5th, at Burnt Ash-road, Lee, Kent, James Alexander Tolmie, M.A., M.B., D.P.H.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

THE LANCET: SUBSCRIPTION RATES.

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Notes, Comments, and Abstracts.

THE BUNAU-VARILLA SYSTEM OF WATER PURIFICATION.

By T. H. Bishop, M.R.C.S. Eng., D.P.H.,
CHIEF MEDICAL OFFICER, EASTERN BENGAL (STATE) RAILWAY.

THE first report [1] published by Dr. Téchoueyres, director of the Bureau of Hygiene and professor at the School of Medicine of Rheims, regarding the working of the newly installed plant for the treatment of the public water-supply to that city, may be said to have removed the Bunau-Varilla system of purification from the category of experimental to that of proved water treatment methods. Until its installation at Rheims it had been tested only on a small scale under war conditions so that its adaptation to a large municipal service was something of a venture. Dr. Téchoueyres's opinion of its value must be given in his own words. He writes:—

"Je puis déclarer aujourd'hui—après un an d'usage—que la ville de Reims a réalisé l'installation la moins onéreuse, la plus simple et la plus parfaite en adoptant l'appareil auto-javelliseur de M. Philippe Bunau-Varilla."

Following Rheims, a number of other French municipalities are now adopting the process with equally satisfactory results, and this increasing popularity is additional proof of its efficiency. It is probable, therefore, that many, besides those professionally occupied with water purification, may find interest in a brief account of this new departure which is sufficiently revolutionary in principle to suggest a reconsideration of many older methods.

The special features of the system cannot be stated more clearly than Dr. Téchoueyres has given them in his report, where he claims that "the originality of the method of M. Bunau-Varilla lies not only in the use of an automatic apparatus but also in the employment of effective doses of sodium hypochlorite which are well below the strength of such as may be perceived by the taste; that, in short, it is capable of purifying a water without depriving it of its natural agreeable qualities."

The Story of its Origin.

Before proceeding to describe the process it will be convenient to refer briefly to the circumstances in which it was devised, which emphasise the technical ability, enterprise, and courage of its author.

During the disastrous autumn of 1916, when France was exploiting every resource to minimise the depletion of her Forces in the gallant struggle to hold the enemy before Verdun, Commandant Philippe Bunau-Varilla, a civil engineer of considerable repute in his profession, found himself responsible for the water service of the 2nd Army which constituted the Verdun defence. The regulations for treating the field water-supplies had been published in a general army order and, as in the case of the Horrock formula, used by British sanitary units, prescribed a dosage calculated to ensure the presence of available chlorine after preliminary absorption tests had been made. The result seems to have been even less appreciated by the French troops than by the British, for, although the average dose of the disinfectant was only 0·06 parts per million greater, the attitude of the men for whose drinking-water supplies he was responsible thoroughly convinced Commandant Bunau-Varilla that the official instructions in regard to this matter could not be carried out. Yet, on the other hand, there could be no possible doubt about the necessity for purification, as samples from the wells adjacent to the front line—the only possible sources of supply—showed the presence of colon bacilli in alarming numbers.

One can readily appreciate the gravity of such a situation, and it is not surprising that it led an officer as zealous and capable as Commandant Bunau-Varilla to thoughtful speculation concerning this method of water purification. Could safety not be attained without coincident nausea? Were the massive doses which produced such a result entirely necessary? The terrible casualties incidental to the defence operations seem to have provided the opportunity for obtaining answers to these questions. An evacuation hospital was required at Fleury-sur-Aire, and its personnel included the chief of the medical laboratory of the 2nd Army—Major Cathoire. To him Commandant Bunau-Varilla carried his problem, suggesting a series of experiments on polluted water samples to ascertain the bactericidal action of minute doses of available chlorine ranging from one decimilligramme per litre up to the minimal official dose of one milligramme per litre. Major Cathoire confesses that he considered the suggested investigation foredoomed to failure in so far as it might be expected to warrant any departure from the official practice, but the zeal and persistence of his brother officer prevailed and he undertook the tests. His earliest results aroused his own interest in the inquiry as they showed an almost complete destruction of the colon bacilli (1000 per litre) in the Fleury-sur-Aire water with a dose of *eau de Javelle* giving 1·0 decimilligrammes of available chlorine, and this destruction became complete when the available chlorine was increased to 1·3 decimilligrammes per litre (0·13 parts per million). Similar experiments were made with samples of the Bar-le-Duc water which contained 33,000 colon bacilli per litre, and here the results were even more remarkable, as complete disappearance of the colon bacilli was secured with a dose of 0·8 decimilligrammes of available chlorine (0·08 parts per million).

The investigation and the results obtained were reported to army headquarters and, without any loss of time, Commandant Bunau-Varilla proceeded to reorganise the water purification arrangements at the 2nd Army depôts. The army water plant was adapted for the use of "doses infinitesimales" and an ingenious contrivance added which secured an automatic supply of the reagent.

Believing that the limit of the bactericidal action of *eau de Javelle* had not been reached, further experiments were made with the water supply to the Château of Souilly—the seat of the headquarter's staff of the Verdun army—and complete elimination of the small colon bacilli content was attained with a dose of one-fiftieth of a milligramme of available chlorine per litre (0·02 parts per million).

Mr. Bunau-Varilla had the misfortune to be seriously wounded shortly afterwards, but the report he had submitted led to the appointment of a scientific commission which repeated and confirmed the experiments of Major Cathoire so far as these dealt with samples of clear water. The commission then proceeded to make similar tests on samples of water charged with organic matter and muddy, with the result that they did not obtain complete destruction of all colon bacilli, but noted a constant marked diminution in their number. The work of this commission was closely followed by the chief of the military epidemic service Prof. Dopter, who later, conjointly with Prof. Rieux, of Val-de-Grâce, made the report public in a communication to the Academy of Medicine of Paris, where, after a description of the improvements which Commandant Bunau Varilla had made in the army water treatment apparatus they stated: "This apparatus has been in use at all the water depôts established by the 2nd Army, and at some of those of the 4th Army, and although the amount of free chlorine provided for by the author of the process is so extremely small the system has given entire satisfaction."

The prolonged and serious illness of Mr. Bunau-Varilla probably prevented any immediate further exploitation of his valuable work, and it seemed improbable at one time that the process would ever be applied on a large scale, when by a stroke of good fortune it came to the notice of Dr. Téchoueyres who, as director of the bureau of hygiene of Rheims, was faced with one of the many health problems which the war created for France. The devastation caused by the prolonged and fierce bombardment to which Rheims was subjected made it necessary for the returning population to select sites for their new dwellings further afield and, in fact, suburbanisation occurred to such an extent that the wells from which the city had hitherto drawn a quite satisfactory water-supply now came within the area of pollution. Keenly alive to the danger which these altered conditions threatened, Dr. Téchoueyres brought the matter to the attention of the municipal authorities. "On chercha," he writes, "un procédé qui guarantit les eaux potables contre une surprise de pollution tout en leur laissant leur goût agréable, et en ne créant aucune charge pécunaire excessive." As mentioned, good fortune brought him into touch with Mr. Bunau-Varilla who undertook to design a plant embodying the principles of his system for the Rheim supply of 3 to 4,000,000 gallons a day. When it is stated that the plant which has now been working for two years cost only 3000 francs (say £30)* to instal and about sixpence per 1,000,000 gallons for running charges, it may be admitted that on the score of economy the choice of process could hardly have been bettered.

Description of the Apparatus.[2]

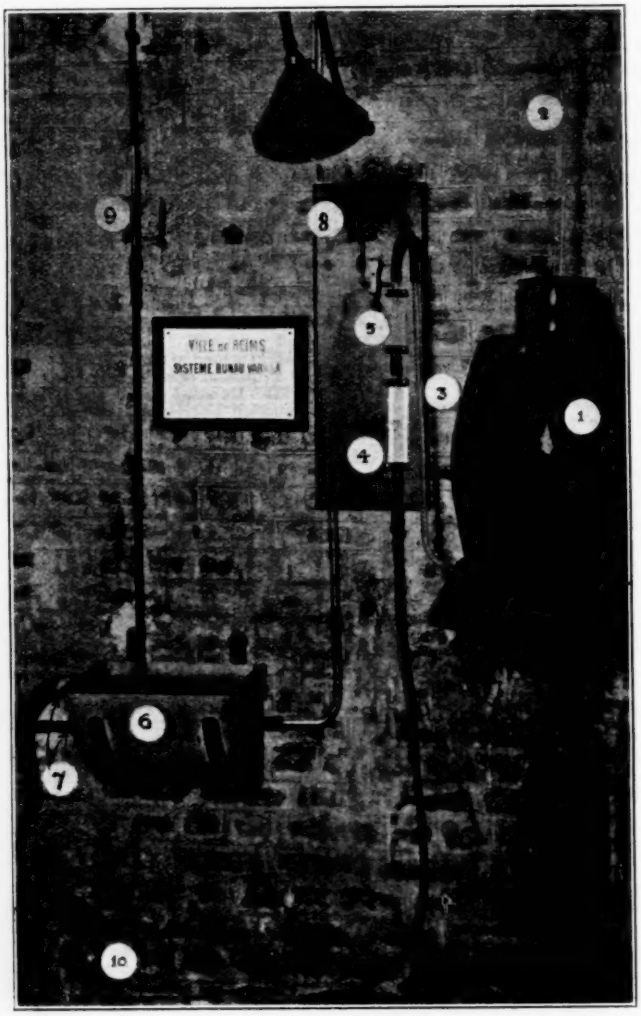
The accompanying photograph will show the simplicity of the mechanism. The partshave been numbered for easy reference.

The apparatus consists of a glass barrel reservoir (1) for diluted *eau de Javelle* solution,† the necessary amount of dilution being determined by the formula given. The reservoir is corked but an air-inlet tube (2) allows atmo-

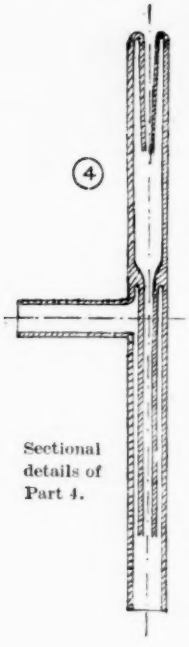
* Mr. Bunau-Varilla has neither patented his apparatus nor accepted any fee for its design.

† *Eau de Javelle* is a solution of NaCl and NaOCl, of variable strength, which can be procured in almost every village in France.

spheric pressure to act on the fluid level at the same time that it minimises loss of strength of the reagent. In operation the fluid is conducted through a bent glass tube (3) to a point (4) termed the *bifurcateur trompe*, where it meets a stream of water which dilutes it further, so that on reaching the water main into which it is discharged a dose of available chlorine of 1 decimilligramme per litre (0·1 parts per million) is provided. The relative quantities of reagent and diluent are also controlled by causing the former to pass through two calibrated constrictions (5) of 5/10 and 8/10 mm. respectively. The stream of diluting water is delivered at constant pressure after passing through an open trough (6), the level of which is maintained by the device of a surplus feed and two waste outlets (7), one at a higher level than the other. An arrangement for bringing a minute quantity of HCl to dissolve any solid particles which may come over and block the flow of the reagent is provided (8), but this technical difficulty does not appear to arise in actual practice. Automaticity is ensured by linking up the pump starter with a valve on the pipe through which the water supplying the pressure-regulating trough passes. The flow throughout the apparatus is excited by suction induced at the point (10) where the disinfecting fluid finds entrance to the water main.



The Bunau-Varilla system installed at Rheims.



Sectional details of Part 4.

My inspection of the Rheims plant left the impression of an extremely simple, effective, and easily supervised contrivance.

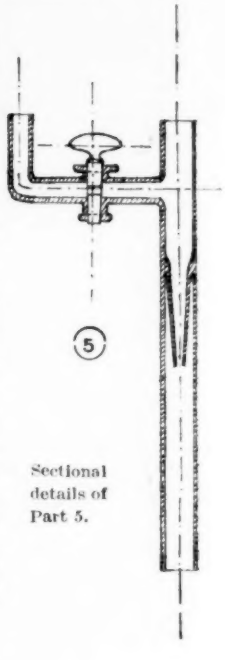
Special Features of the Process.

It is probable that when the urgent need for obtaining a safe and acceptable drinking water-supply for the Verdun troops caused Mr. Bunau-Varilla to speculate regarding the dose of chlorine which was required for purification he was unaware of the work which had been done by other investigators in regard to the same problem and, possibly, he has congratulated himself since on his opportune ignorance, for there can be few problems which have evoked such widely differing opinions. At the one extreme is Nissen of the Berlin Hygienic Institute, whose experiments required 420 parts per million of available chlorine to produce sterilisation in one minute, and half that amount to effect it in ten minutes, and at the other extreme is the careful work of Race,[3] of Ottawa, who found that a suspenon of 1000 colon bacilli per c.cm. could be reduced to the 2 bacilli standard in ten minutes, in a water from which organic matter was absent, with 0·1 parts per million. For the London water-supply the dose employed is slightly more than 0·5 parts per million, but in this case the reagent is added prior to filtration.[4] The practice of Mr. Dienert, of the Paris Water Service, is to make a preliminary absorption test and then to add 2 decimilligrammes of available chlorine per litre. This is for a contact period of three hours. The methods followed in the treatment of other large public supplies further indicate the diversity of opinion which exists, but the story of the legal battle which was occasioned by the experiments on the Boonton portion of the supply to Jersey City, U.S.A., would probably have heartened Mr. Bunau-Varilla had he known it in those anxious days. As long ago as 1908 Mr. G. A. Johnson and Prof. Leal, being associated in a scheme for treating the Boonton supply, followed a policy of employing gradually reduced doses until they had decreased these from an initial dose of 1·4 parts per million of available chlorine to 0·2 parts per million. At this point the city authorities seem to have taken fright and the law was invoked. The judgment is worth quoting from.

"From the proofs taken before me," announced the court, "of the constant observation of this device I am of opinion and find that it is an effective process which destroys in the water the germs, the presence of which is deemed to indicate danger, including the pathogenic germs, so that the water after this treatment attains a purity much beyond that attained in water-supplies of other municipalities. The reduction and practical elimination of such germs from the water was shown to be substantially continuous."

Possibly had this story been better known generally, and more work done on the lines followed by the Rheims investigators, the system of Mr. Bunau-Varilla would not have had to wait so long for its début.

It is to be observed, in appreciation of the part which Dr.



Sectional details of Part 5.

Téchoueyres has played in the evolution of this process, that its adoption for the Rheims public supply was not decided upon without very careful consideration, and some noteworthy experimental work has been done at the Reims public health laboratory which, in his opinion, has established several important facts serving to explain the process scientifically. The first of these facts is the proof of persistence for a long period of effective, if minute, dose of available chlorine irrespective of the relative amounts of organic matter and disinfectant which may be brought into contact in a water sample. As he states it "the quantity of chlorine which is fixed by a water is not, as one might suppose, determined by the quantity of organic matter present."

This statement runs directly counter to the presumption on which absorption tests are based. It would be assumed from the latter that the majority of waters, by reason of their organic content, would account for more than the amount of chlorine available in the Bunau-Varilla process, but the Rheims experiments indicate otherwise. They suggest instead, that the organic gourmand may always be relied upon to leave a few crumbs for the more reticent guests. The details of a series of experiments will illustrate this.

A litre of Marne water (organically impure) was placed in each of three flasks and to these were added sodium hypochlorite giving 0·5, 3·0 and 6·0 milligrammes of free chlorine respectively. Half an hour's contact was allowed and the contents of the flasks were then tested for the quantity of chlorine which had been fixed by the litre of water in each. In the first flask to which 0·5 milligramme had been added the proportion of chlorine fixed, to the original dose, was 86 per cent., in the second flask 47·3 per cent., and in the third flask 29 per cent.

A second series of experiments showed that if the organic gourmand was fed in three successive stages, at half-hourly intervals, with sodium hypochlorite providing respectively 1/2, 3 and 3 milligrammes of available chlorine, the proportions fixed were 86, 50, and 49·6 per cent.

Dr. Téchoueyres's observations on these experiments are, first, that the proportion of chlorine which is fixed varies with the quantity offered, and, secondly, that successive additions cause a greater absorption than a single meal, and both prove that the results cannot be explained on the basis of chemical interaction.

A second fact which the Rheims workers claim to have established is the difference in vulnerability to *eau de Javelle* of organisms of the typhoid group and the colon bacilli—the latter, in their experiments, proving the more resistent. It is to be noted that other investigators have not been able to come to so definite an opinion on this point, but the desirability of such an assurance is apparent in view of the margin of safety which it affords where the colon bacillus standard of purity is adopted.

The third fact which the Rheims observations have emphasised is the effect which agitation and prolonged contact have upon the degree of purity attained. In this connexion details are given which indicate that even the feeble doses employed are actually or potentially available for more than 24 hours, and that during this period their destructive action continues. This is corroborated by other observers, and as regards contact by the interesting judgment which has been quoted in the Boonton case. As regards "brassage" or agitation, Dr. Téchoueyres considers this as of equal value, at least, with duration of contact.

The Bactericidal Ray Hypothesis.

Whilst it is not essential to a description of the water purification system devised by Mr. Bunau-Varilla, this note on certain features of the work which has been incidental to its evolution would be incomplete without a brief reference to the interesting hypothesis which has been adopted by the authors in explanation of the action of doses of chlorine which are so chemically inadequate and yet so practically effective. To emphasise this inadequacy Dr. Téchoueyres postulates the current theory of the action of sodium hypochlorite in the purification of water, represented by the formula:—

$$NaOCl + H_2O = HCl + NaOH + O$$

or, in the presence of a catalyser,

$$NaOCl = NaCl + O$$

—i.e., an atom of oxygen, with the atomic weight of 16, is liberated by an atom of chlorine with the atomic weight of 35·5. Noting that the Rheims water contains organic matter equivalent to about 1 milligramme of oxygen, he remarks that obviously twice this amount of chlorine should be required to replace this alone, whereas in actual practice the addition of a twentieth of the quantity proves to be an effective bactericide. From so irreconcilable a supposition the authors fall back on the hypothesis formulated by Mr. Jean Perrin (published under the title "Matière et Lumière" in the *Annales de Physique* in 1919) that all chemical reactions and, generally speaking, all changes in the physical state of bodies give rise to the emission or reception of particular rays. Arguing on this assumption Mr. Bunau-Varilla and Dr. Téchoueyres suggest that the rupture of the molecule of sodium hypochlorite, when added to water, produces an emission of rays analogous to ultra-violet rays much in the same manner that luminous rays are incidental to ordinary combustion, and that such special rays are the true lethal agent. They state that they have obtained a certain amount of confirmation of this hypothesis.

This brief account of a prolonged investigation which cannot be without interest to all engaged in water purification will show that there are debatable features—bacteriological standards, technique, general conditions—all are variable, and even the reagent employed is not the same as used in this country, but when all these have been discounted two incontestible facts remain: first, that the Bunau-Varilla system is adequate, in practice, to the production of a safe public water-supply: and, secondly, that it is superior in point of economy, simplicity, and absence of objectionable results to many processes now in use.

My acknowledgments are due to Profs. Besredka and Calmette, of the Pasteur Institute, from whom my earliest information of the Bunau-Varilla system was obtained, and to Dr. Téchoueyres for his courtesy in demonstrating and explaining it and the details of the work which has been done in connexion with it.

References.

1. Sterilisation des Eaux Potables par Auto-Javellisation (Système Bunau-Varilla). Obtainable from the Bureau municipal d'hygiène, Reims.
2. Historique et Description de Auto-Javellisation (Système Bunau-Varilla). Obtainable as above.
3. Chlorination of Water, by Joseph Race, F.I.C. London: Chapman and Hall. (This excellent work has been frequently quoted from in the foregoing paper.)
4. Twenty-third Annual Report of the Metropolitan Water Board.

A DESK MANUAL.

Mr. J. B. Thornhill has reproduced the Hippocratic Oath [1] in incised white letters on blackwood panel, to be placed on the doctor's desk. The panel is 9¼ inches by 7¼ inches—i.e., it is roughly double the size of an ordinary sheet of writing paper—and the width of the lettering is 5¼ inches, giving an inch margin between the bevelling and the lettering, which is executed in five well-balanced paragraphs dealing with the doctor's relations to his patients. Mr. Thornhill has ignored the duties of the doctor to his brother doctors, his rendering being as follows:—

THE DOCTOR'S OATH.

I will follow the system of regimen which, according to my ability and judgement, I consider for the benefit of my patients and abstain from all that is mischievous and deleterious.

I will give no deadly medicine if asked, nor will I suggest such plan; so too, I will not procure abortion.

With Purity and Holiness I will pass my life and practise my Art.

Into whatever houses I enter I will go into them for the benefit of the sick and abstain from all voluntary actions of mischief and corruption.

Whatever in professional practice or outside it in the life of the world I see or hear, which ought not to be spoken abroad, I will not divulge, for such things should be kept secret.

The idea of the panel is to show the layman the earnestness and discretion of the medical profession, whose ideals few members of the general public realise.

ELECTROTHERAPY AFTER PROSTATECTOMY.

To the Editor of THE LANCET.

SIR,—A man of 65 had his enlarged prostate removed by the suprapubic route as it was producing retention overflow. He was also in a state of low resistance owing to a combined degeneration of his spinal cord. Fourteen days after the operation the wound was unhealthy and septic, and showed no signs of closure. He was given daily local massive doses of tungsten arc ultra-violet light to the wound for five days, and general irradiation to different parts of his body in ordinary doses. High frequency with the vacuum electrode was also applied to the wound itself. Within four days the whole area had become clean, and within 14 days the wound had closed up.

I am, Sir, yours faithfully,

Sheringham, Norfolk, Feb. 9th, 1929. H. W. HALES.

Messrs. Armour and Company, manufacturers of Glanoid medicinal products of animal origin, have removed their pharmaceutical department from Kingsway to Armour House, St. Martin's le Grand, London, E.C. 1.

[1] The Doctor's Oath. 176 Blackwood Panels, 12*s.* 6*d.* each. Stand, 1*s.* 6*d.* J. B. Thornhill, Geldeston, Beccles, Suffolk.

Medical Diary.

Information to be included in this column should reach us in proper form on Tuesday, and cannot appear if it reaches us later than the first post on Wednesday morning.

SOCIETIES.

ROYAL SOCIETY OF MEDICINE, 1, Wimpole-street, W.

TUESDAY, Feb. 18th.—5.30 P.M., GENERAL MEETING OF FELLOWS: Ballot for election to the Fellowship. 8 P.M., PATHOLOGY. Communications: J. D. W. Bland: Filter and Centrifuge Experiments with Neuro-vaccine. H. D. Wright: The Susceptibility of the Pneumococcus to Inhibiting Influences. R. M. Fry: The Leucocyte Count in Defibrinated Blood. Demonstrations: J. M. Ross: Ayerza Syndrome with Pulmonary Syphilis. G. Hadfield: Landau's Disease.

THURSDAY.—5 P.M., DERMATOLOGY. (Cases at 4 P.M.). Dr. J. E. M. Wigley: 1. Scleroderma. 2. Urticaria Pigmentosa in an Adult. 3. Pityriasis Rubra Pilaris. Other cases will be shown.

FRIDAY.—5 P.M. DISEASE IN CHILDREN. (Cases at 4.30 P.M.). Short paper. Dr. Gerald Slot: A Clinical Method of Estimating Cardiac Efficiency in Children, and the Work of a Rheumatism Supervisory Centre. 8 P.M., EPIDEMIOLOGY. Paper: Surgeon-Commander Sheldon F. Dudley: Human Adaptation to a Parasitic Environment.

MEDICAL SOCIETY OF LONDON, 11, Chandos-street, Cavendish-square, W.

MONDAY, Feb. 18th.—9 P.M., Dr. H. W. Wordsworth Barber: Dermatology in Relation to Other Branches of Medicine. (First Lettsomian Lecture.)

ROYAL SOCIETY OF TROPICAL MEDICINE AND HYGIENE, 11, Chandos-street, W.

THURSDAY, Feb. 21st.—8.15 P.M. (preceded at 7.45 P.M. by a demonstration illustrating the subject of the paper). Dr. L. W. Hackett: Malaria Control Through Anti-Mosquito Measures in Italy.

CHELSEA CLINICAL SOCIETY.

TUESDAY, Feb. 19th.—8.30 P.M. (at the Hotel Rembrandt, Thurloe-place, S.W.). Dr. Eckenstein: Folklore. Opened by Dr. Dan McKenzie.

ROYAL SOCIETY OF ARTS, John-street, Adelphi, W.C.

MONDAY, Feb. 18th.—8 P.M., Sir Thomas M. Legge: Thirty Years' Experience of Industrial Maladies. (First Shaw Lecture.)

MEDICAL SOCIETY FOR THE STUDY OF VENEREAL DISEASES, 11, Chandos-street, Cavendish-square, W.

FRIDAY, Feb. 22nd.—8.30 P.M., General Meeting. Dr. H. C. Semon: The Diagnosis and Treatment of Non-Syphilitic Lesions of the Male and Female Genitalia. A discussion will follow which will be opened by Dr. H. M. Hanschell.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION, 1, Wimpole-street, London, W.

MONDAY, Feb. 18th to SATURDAY, Feb. 23rd.—MEDICAL SOCIETY OF LONDON, 11, Chandos-street, Cavendish-square, W. Mon., 5 P.M., Lecture, Dr. A. C. Roxburgh: Pitfalls in Dermatology.—NATIONAL HEART HOSPITAL, Westmoreland-street, W. Tues., 10.30 A.M., Clinical Demonstration, Dr. B. T. Parsons-Smith.—WELLCOME MUSEUM OF MEDICAL SCIENCE, 33, Gordon-street, W.C. Wed., 4 P.M., Demonstration, Dr. C. M. Wenyon: The Part played by Animals in the Spread of Disease.—CENTRAL LONDON THROAT, NOSE AND EAR HOSPITAL, Gray's Inn-road, W.C. Thurs., 2 P.M., Clinical Demonstration, Mr. Gill-Carey.—The above are free.—CHELSEA HOSPITAL FOR WOMEN, Arthur-street, S.W. Post-graduate course in Gynæcology. Mornings and or afternoons. Second week.—ST. JOHN'S HOSPITAL, Leicester-square, W.C. Special post-gra duate course in Dermatology. Every afternoon, clinical work. Lectures twice weekly. Further particulars from the Secretary.

UNIVERSITY COLLEGE, London.

TUESDAY, Feb. 19th.—5.30 P.M., Miss E. M. Elderton: Growth Curves in Women from Childhood to eid Age.

FRIDAY, Feb. 22nd.—5.30 P.M., Dr. J. Howard-Jones: The Hygiene of the Mercantile Marine. (First lecture: Chairman, Dr. Charter Porter.)

HOSPITAL FOR SICK CHILDREN, Great Ormond-street, W.C.

THURSDAY, Feb. 21st.—4 P.M., Dr. Wyllie: Infection of the Genito-Urinary Tract.

NATIONAL COUNCIL FOR MENTAL HYGIENE.

WEDNESDAY, Feb. 20.—5 P.M. (at the Medical Society of London, Chandos-street, W.), Dr. Letitia Fairfield: Efficiency and Deficiency.

(Continued at foot of next column.)

(Continued from previous column.)

NORTH-EAST LONDON POST-GRADUATE COLLEGE, Prince of Wales's General Hospital, Tottenham, N.

MONDAY, Feb. 18th.—2.30 to 5 P.M.: Medical, Surgical, and Gynæcological Clinics. Operations.
TUESDAY.—2.30 to 5 P.M.: Medical, Surgical, Throat, Nose and Ear Clinics. Operations.
WEDNESDAY.—2.30 to 5 P.M.: Medical, Skin, and Eye Clinics. Operations.
THURSDAY.—11.30 A.M.: Dental Clinics. 2.30 to 5 P.M.: Medical, Surgical, and Ear, Nose and Ear, Nose and Throat Clinics. Operations.
FRIDAY.—10.30 A.M.: Throat, Nose and Ear Clinics. 2.30 to 5 P.M.: Surgical, Medical, and Children's Diseases Clinics. Operations.

ROYAL NORTHERN HOSPITAL, Holloway-road, N. (Intensive Week.)

MONDAY, Feb. 18th.—2.15 P.M., Mr. Kenneth M. Walker: Chronic Infection of the Urinary Tract. 3.15 P.M., Dr. W. J. Adie: Some Sudden Attacks of Nervous Origin.
TUESDAY.—2.15 P.M., Mr. F. D. Saner: The Repair of Fractures. 3.15 P.M., Dr. E. G. B. Calvert: Points of Practical Importance in Glycosuria and Albuminuria.
WEDNESDAY.—2.15 P.M., Mr. N. A. Jory: Chronic Nasal Obstruction. 3.15 P.M., Dr. H. C. Semon: Demonstration of Selected Cases.
THURSDAY.—2.15 P.M., Dr. W. H. McKinstry: Pathological Specimens. 3.15 P.M., Mr. C. S. Lane-Roberts: Some Disorders at the Menopause.
FRIDAY.—2.15 P.M., Dr. Bruce Williamson: Demonstration of Selected Medical Cases. 3.15 P.M., Mr. T. T. Higgins: Some Points in the Ætiology and Diagnosis of Gall-stones.

NATIONAL HOSPITAL, Queen-square, W.C.

MONDAY, Feb. 18th.—12 noon, Dr. Greenfield: Pathology of Nervous System. 2 P.M., Dr. Riddoch: Out-patient Clinic. 3.30 P.M., Dr. Collier: Cerebral Vascular Disease.
TUESDAY.—2 P.M., Dr. Walshe: Out-patient Clinic. 3.30 P.M., Mr. Donald Armour: Surgery of Compression Paraplegia.
THURSDAY.—2 P.M., Dr. Kinnier Wilson: Out-patient Clinic. 3.30 P.M., Dr. Gordon Holmes: The Demonstration of Cerebellar Lesions.
FRIDAY.—12 noon, Dr. Purdon Martin: Anatomy and Physiology of the Nervous System. 2 P.M., Dr. Adie: Out-patient Clinic. 3.30 P.M., Dr. Walshe: Multiple Neuritis.

UNIVERSITY OF SHEFFIELD POST-GRADUATE CLINICS.

FRIDAY, Feb. 22nd.—3.30 P.M., Mr. Hay: Spectacles, Ancient and Modern.

ST. MARY'S HOSPITALS POST-GRADUATE LECTURE. Manchester.

FRIDAY, Feb. 22nd.—4.30 P.M. (at the Whitworth-street West Branch), Mr. Morley: The Treatment of Birth Injuries.

THE KING'S ILLNESS.

OFFICIAL BULLETINS.

(Continued from p. 320.)

THE following official bulletins have been issued:—

THURSDAY, FEB. 7TH. 11.45 A.M.

Though the stage of convalescence has not yet arrived, His Majesty's progress is such that the proposed change to the south coast is now desirable. (Signed by Sir Stanley Hewett, Sir Hugh Rigby, Sir Farquhar Buzzard, Sir Humphry Rolleston, and Lord Dawson of Penn.)

FRIDAY, FEB. 8TH. 12.15 P.M.

The progress of His Majesty the King, though slow, continues. A radiogram taken this morning confirms the clinical evidence that the condition of the lungs is now normal. If the weather permits, His Majesty will leave the Palace at 10.30 to-morrow morning for Craigweil House. (Signed by Sir Stanley Hewett, Dr. H. Graham Hodgson, and Lord Dawson of Penn.)

SATURDAY, FEB. 9TH. 6 P.M.

His Majesty the King travelled to Craigweil House without undue fatigue, and the general condition is satisfactory. (Signed by Sir Stanley Hewett and Lord Dawson of Penn.)

SUNDAY, FEB. 10TH. 4 P.M.

His Majesty the King had a good night, and his improvement continues. (Signed by Sir Stanley Hewett and Lord Dawson of Penn.)